FOUNDRY

JULY 1957

A PENTON PUBLICATION

Budgeting for Profit: Budgetary control can be an important tool. Here is how to use it —*page 94*

Graphitization of Malleable Iron: Influence of carbon-silicon ratio on graphitization —*page 101*

Riser Requirements: New method helps to study data for determining correct size of risers —*page 106*

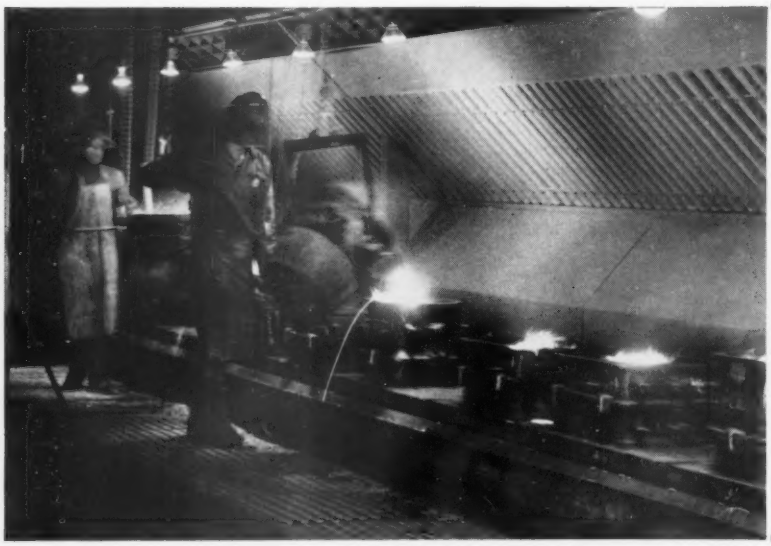
FOUNDRY EXPANSION

Careful planning permits expansion of plant without interruption to production —*page 86*

PROVED BY INDEPENDENT LABORATORY TESTS:

62% S·M·I*

for FERROCARBO®-TREATED IRON



Progressive foundrymen seeking to improve the machinability and quality of gray iron and malleable iron castings can now rely upon FERROCARBO — the patented additive in briquette form — by CARBORUNDUM. Tests by a widely-known independent research organization, have proved conclusively that the addition of FERROCARBO® to the cupola charge results in finer-grained, denser, and stronger castings with a machinability improvement factor as high as 62% over untreated iron. The better *dispersal action* of FERROCARBO and the resulting *better machinability* of the iron, are your assurance of a *better satisfied* customer.

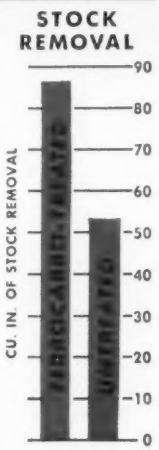
* Surface Machinability Improvement

HOW TESTS WERE CONDUCTED

Tool-wear tests were conducted on metal cast in leading foundries across the country, using untreated iron and Ferrocarbo-treated iron of identical or similar chemistry. Both were machined at commercial speeds using a single point "Carboloy," grade 44A tool. Tool life was determined by measuring wear on the flank of the tool with a 100-power microscope. The charts at the right show actual test data as reported.

WRITE FOR MORE INFORMATION on how FERROCARBO produces more machinable iron regardless of metal composition. Ask for booklet — Form A-1409 — Electro Minerals Division, The Carborundum Company, Niagara Falls, New York.

Chemical Analyses	Untreated	Ferrocarbo® Treated
C	3.57	3.56
Si	2.25	2.26
S	.10	.10
Mn	.68	.66
P	.11	.11
Cutting speed (ft./min.)	300	300
Feed (in./rev.)	.009	.009
Depth of Cut (in.)	.062	.062
Wear land (in.)	.015	.015
Vol. of metal removed (cu. in.)	53	86
Weight of metal removed (lbs.)	13.7	22.2
Per Cent improvement		62%



ELECTRO MINERALS DIVISION

The CARBORUNDUM Company

REGISTERED TRADE MARK

FERROCARBO DISTRIBUTORS — KERCHNER, MARSHALL & CO., PITTSBURGH • Cleveland • Buffalo • Philadelphia • Birmingham • Los Angeles • Canada
MILLER & COMPANY, CHICAGO • St. Louis • Cincinnati

Circle 551 on Inquiry Card—Page 51

B.F.Goodrich report:

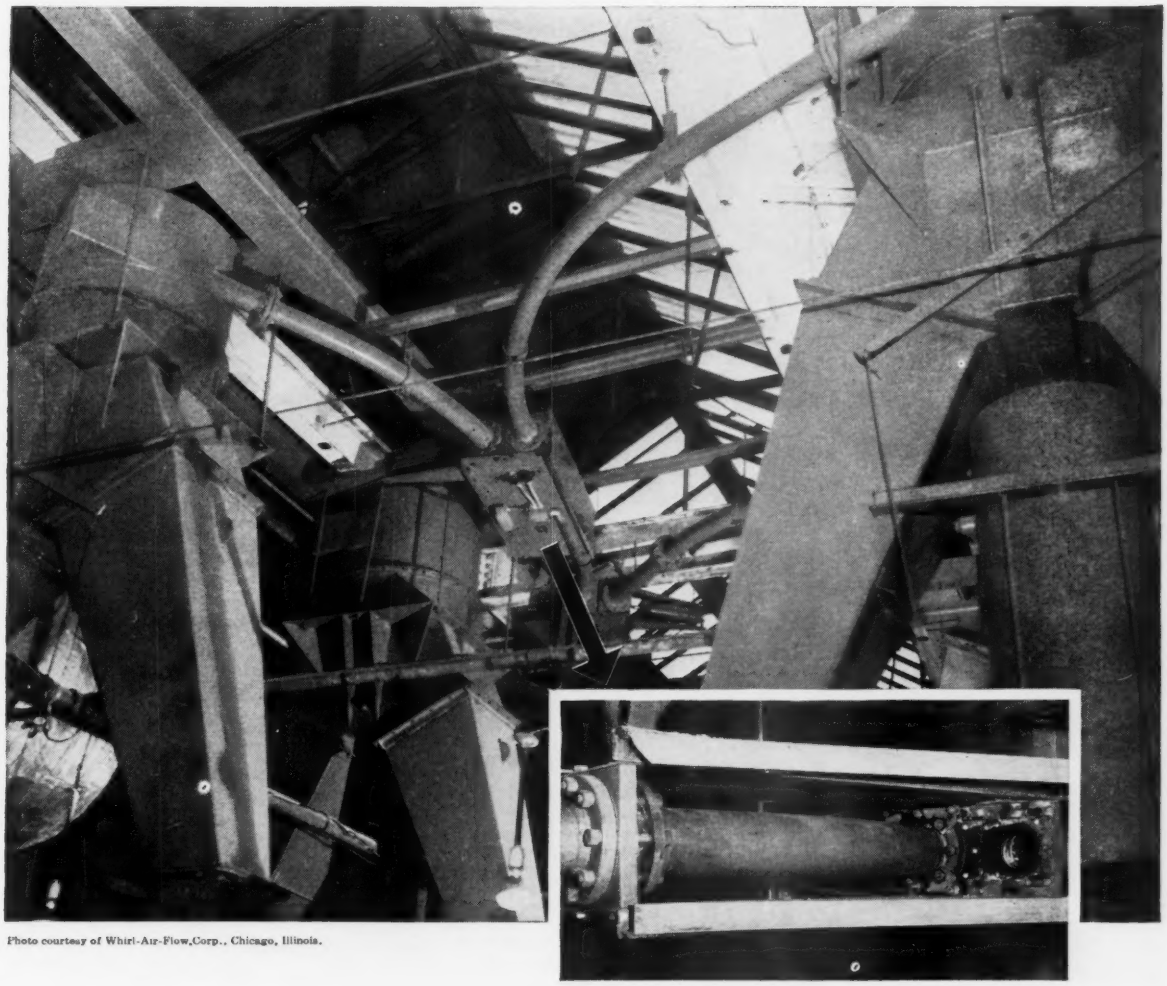


Photo courtesy of Whirl-Air-Flow,Corp., Chicago, Illinois.

Pipe carries sand the easy way

B. F. Goodrich improvements in rubber brought extra savings

Problem: In this foundry, workmen used to push wheelbarrows loaded with sand to the coremakers. Now the sand is simply blown through those overhead pipes to hoppers all over the building. Only one trouble.

A flexible hose was needed to switch the sand from one pipeline to another. (See inset.) Rubber hose was tried. The swirling sand quickly wore holes in it. Another kind stretched so much from the constant flexing that it jammed the switch.

What was done: When a B.F.Goodrich man heard of the problem he recommended a hose, specially developed by B.F.Goodrich to handle rough materials. It is made with a special wear-resisting rubber, so tough it outlasts hard steel 10 to 1 on many jobs. The hose has a specially treated fabric reinforcement that keeps it from stretching.

Savings: The B.F.Goodrich hose was tried. Instead of digging in and cutting, the sharp particles of sand simply bounce off the extra-soft rubber lining. It has now given 2 years of service and shows no signs of wear or stretch. In fact, the company making this equipment is now using only B.F.Goodrich hose.

For information: This hose is one of hundreds of kinds B.F.Goodrich makes for thousands of industrial uses. Your B.F.Goodrich distributor can recommend a hose exactly fitted to meet the special requirements of your work. And, as a factory-trained specialist, he *can* answer your questions about *all* the rubber products B.F.Goodrich makes for industry. *B.F.Goodrich Industrial Products Co., Dept. M-102, Akron 18, Ohio.*

B.F.Goodrich

INDUSTRIAL PRODUCTS

Circle 554 on Inquiry Card—Page 51

WE'RE HERE TO STAY!

EXPANDED FACILITIES HAVE ALREADY BEEN COMPLETED AT OUR "GREEN BOND" PLANT...

...FURTHER EXPANSION IS PLANNED FOR THE NEAR FUTURE—PROOF WE'RE HERE TO STAY!

If it's easier, better sand control you're after—here's the answer! These three materials, added in varying amounts to sand (dry or in slurry), will give you *close control* over green and dry strength and carbon content, and also provide GREATER FLOWABILITY and LESS LUMPY SHAKEOUT!

GREEN BOND Bentonite excels in developing and controlling green and dry strength. Its medium to low viscosity cuts down on mulling time and permits slurry users to add more bentonite per gallon of slurry, without strain on the pumping system. CROWN HILL Seacoal is exceptionally low in sulphur content, which means your castings will have more easily machined surfaces. Federal SAND STABILIZER improves the flowability of sand and eliminates lumps in sand shakeout. It burns out faster than any other facing material. Since it has a very low ash content and has no deteriorating effect on sand, you can re-use your molding sand *safely*.

And this is important—these advantages, plus many others, are yours at low cost. For these sand additives will actually cost you *less than $1.00 per ton of castings produced!* To learn more about them, write for your copy of *"Tailor-Made Molding Sands"*.

FEDERAL

The FEDERAL FOUNDRY SUPPLY Company

4600 EAST 71st STREET, CLEVELAND 5, OHIO

FEDERAL WAREHOUSES—Chicago, Cleveland, Cranston, R. I., Crown Hill, W. Va., Detroit, Los Angeles, Milwaukee, Minneapolis, New York, Richmond, Syracuse, Upton, Wy(

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FOUNDRY
A PENTON PUBLICATION

July 1957
Volume 85—Number 7

Editorial 85

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Cleveland 13, Ohio
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(For addresses of branch offices, see page 257)

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HOW TO shed new light on your old sand problems

CALL ON YOUR ARCHER FIELD REPRESENTATIVE. PUT HIM TO WORK IN YOUR FOUNDRY. HE'S CLOSE BY READY TO HELP RELIEVE YOUR MOST PERPLEXING PROBLEMS INVOLVING SANDS AS THEY RELATE TO CASTING QUALITY AND ECONOMY.

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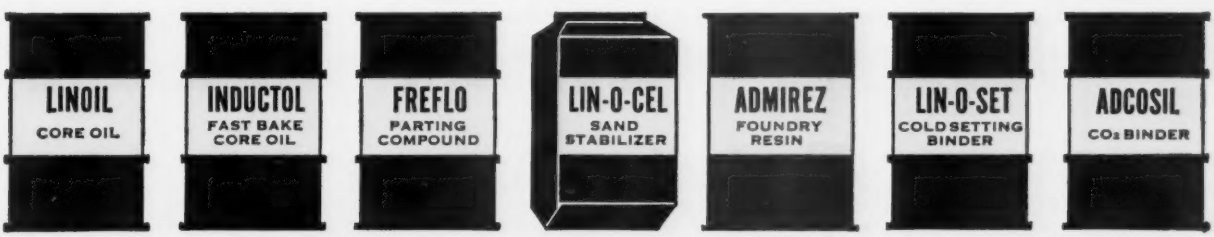


Archer Daniels Midland company

FOUNDRY PRODUCTS DIVISION • 2191 WEST 110th ST., CLEVELAND 2, OHIO

This 'Budgit' Hoist and low-cost 180° swinging jib crane serves a 353 sq. ft. work area. Crane can be assembled in your plant in an hour.

353 SQUARE FEET

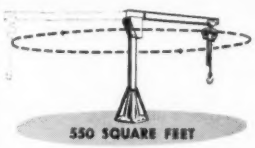
Here's Hard-to-Beat Load Handling For You!

IT'S ECONOMICAL. The 'Budgit' Hoist is the most widely used electric hoist in the world. It's simple, efficient mechanism and powerful motor provide fast lifting action. A ¼-ton load can be raised a foot in less than two seconds. Capacities range from ⅛ to 2 tons. A few cents pays for the electricity to operate any 'Budgit' all day.

IT'S ADAPTABLE. Used alone, the 'Budgit' Hoist can serve a work area of 19½ sq. ft. To multiply the operational range of any 'Budgit' many times, we can supply a variety of low-cost jib and bridge crane assemblies. With any one of them every shop or factory can have efficient, easily-installed crane service that makes a single hoist do the work of several.

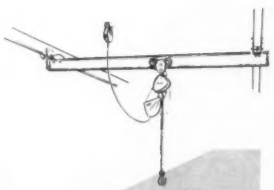
IT'S SAFE. To protect the operator, the load and the hoist itself, the 'Budgit' has automatic upper and lower safety stops; one hand control; **two** instant-action brakes, each alone powerful enough to hold the load; fracture-proof hooks; enclosed wiring — and many more.

Your "Shaw-Box" Distributor can give you full details on 'Budgit' Hoists and crane equipment . . . or write us for Bulletin 406.



550 SQUARE FEET

A 'Budgit' Hoist on full-revolving, self-supporting 'Load Lifter' Jib Crane can serve a 550 sq. ft. area. Excellent on shipping platforms, at machine tools, in foundry molding bays. Crane bolts to floor; rotates on ball bearings.



2000 SQUARE FEET

Used with a No. 62 'Budgit' Bridge Crane Assembly, a 'Budgit' Hoist can serve a 2,000 sq.ft. area. Crane comes in a "package"—your men can assemble the unit without drilling or machining.

A 'Budgit' Hoist on a 'Budgit' Gantry "A" Frame provides economical mobile service for machine shops, service stations and places where loads must be lifted and moved anywhere in the work area.

57A-10

MAXWELL MANNING & MOORE INC. MM&M TRADE MARK

'Budgit'® ELECTRIC HOISTS

MANNING, MAXWELL & MOORE, INC.

SHAW-BOX CRANE & HOIST DIVISION

386 West Broadway, Muskegon, Michigan

Builders of "SHAW-BOX" and 'LOAD LIFTER' Cranes, 'BUDGIT' and 'LOAD LIFTER' Hoists and other lifting specialties. Other Divisions produce 'ASHCROFT' Gauges, 'HANCOCK' Valves, 'CONSOLIDATED' Safety and Relief Valves, 'AMERICAN' and 'AMERICAN-MICROSEN' Industrial Instruments, and Aircraft Products.

In Canada: *Manning, Maxwell & Moore of Canada, Ltd., Avenue Road, Galt, Ontario.*

find out how you can bake your cores better, faster more economically **ELECTRONICALLY!** in

This Coleman 150-CD Dielectric Core Oven bakes over 8,000 pounds of urea-bonded pipe fittings cores per hour at Alabama Pipe Company, Anniston, Ala. Total time on conveyor is 11 minutes!

COLEMAN Dielectric OVENS

Which is better for you . . . dielectric or recirculating air core ovens?

As builders of the world's only complete line of foundry ovens, only Coleman Oven Engineers can give you practical, unbiased recommendations for your particular application.

The foundries pictured are typical users of Coleman Dielectric Core Ovens. These ovens were installed after a thorough study by Coleman Oven Engineers indicated that dielectric core baking would be the most economical method in each case.

Because of this approach, based on over half a century of foundry "know how" combined with the latest electronic technology, every Coleman Dielectric Core Oven installation has been extremely profitable. Important savings have been made in time . . . in manpower . . . and through increased production.

Consult a Coleman Oven Engineer. There is no obligation. As builders of the world's only complete line of foundry ovens we have no reason to recommend anything but the best oven for your needs . . . We build them all.

WRITE FOR NEW BULLETIN 657

The Deming Co., Salem, Ohio, uses their Coleman 30-CD Dielectric Core Oven to bake a wide variety of phenol-bonded cores for cast iron and brass pump castings.

Hills-McCanna Company, Chicago, Ill. bakes 1500-1700 pounds of cores per hour for magnesium aircraft engine castings in their Coleman 30-CD Dielectric Core Oven.

A COMPLETE RANGE OF TYPES AND SIZES . . .
for every core baking and mold drying requirement:

Tower Ovens • Horizontal Conveyor Ovens
Car-Type Core Ovens • Car-Type Mold Ovens
Transrack Ovens • Rolling Drawer Ovens
Portable Core Ovens • Portable Mold Dryers
Dielectric Core Ovens

THE FOUNDRY EQUIPMENT COMPANY
1821 COLUMBUS ROAD CLEVELAND 13, OHIO
WORLD'S OLDEST AND LARGEST FOUNDRY OVEN SPECIALISTS

MEMBER FEMA

Please and

PROTECT EVERY WORKER*

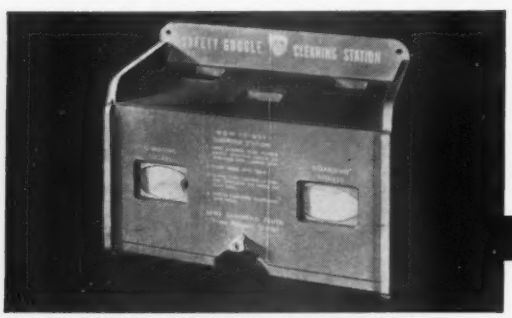
with Comfortable, Engineered AO F5100 Safety Glasses!

(*Who needs impact protection)

Here are our popular metal frame Ultrascopic Safety Glasses with many new features. In comfort, safety and styling (which makes the device willingly worn) there is no better eye protection. Specify the AO F5100 — reduce accident costs!

NEW FEATURES INCLUDE:

- Complete range of eye sizes (42, 44, 46, 48)
- Complete range of bridge sizes (18, 20, 22, 24, 26)
- 2 temple styles in all lengths. Comfort cables for both side shield and non side shield models, spatula temples for latter
- Screen, clear acetate and green acetate side shields
- Clear and Calobar 6 curve lenses



To be safe keep Safety Glasses clean!

AO 750 LENS CLEANING CABINET

Stationed at strategic plant locations, these cabinets give workers everything needed to keep safety glasses at peak visual efficiency. Cabinet is a small compact unit, providing all necessary cleansing and anti-fog materials. Made of selected hardwood, safety green lacquered finish. 12″ long, 9″ high, 6″ deep. Contains 6 oz. bottle 750B and sprayer.

750S: Bottle can be used with AO #750F Fluid or AO 350AF Super-Clear anti-fog-cleaner fluid.

750T Cleansing Tissue: 2 boxes each with 120 sheets supplied. 2 openings in front of cabinet permit easy detachment of single sheets (no waste).

Tissue Disposal: 2 openings at top of cabinet provide for disposal, keep area neat and tidy.

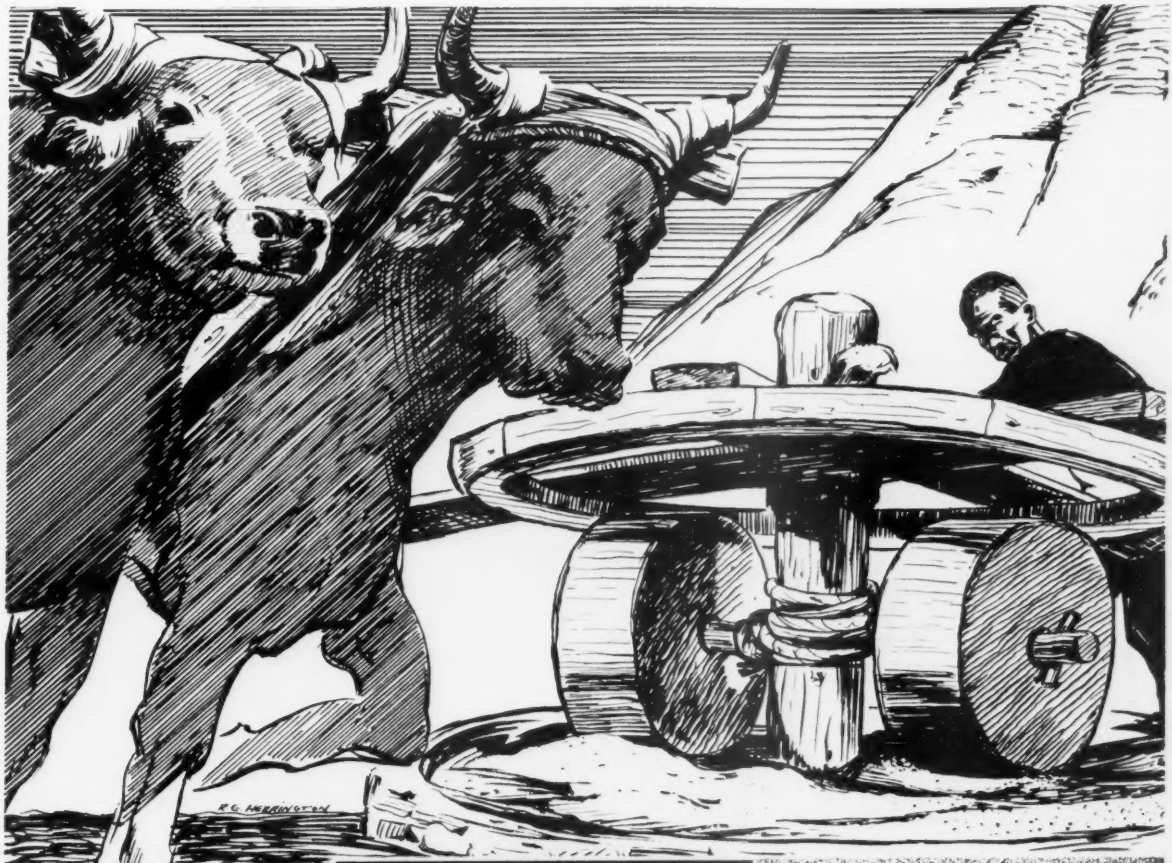
111 Anti-Fog: 1 oz. jar supplied with cabinet. AO 350AF Super-Clear available on special order.

American Optical Sweatbands increase worker comfort and efficiency, keep sweat out of eyes — prevent accidents — for pennies! Check your needs.

Always Insist on AO Trademarked Safety Products. Your nearest American Optical Safety Products Representative can supply you.

SOUTHBRIDGE, MASSACHUSETTS
BRANCHES IN PRINCIPAL CITIES

American Optical
COMPANY
SAFETY PRODUCTS DIVISION



IS YOUR FOUNDRY IN THE DARK AGES

When it comes to conditioning your sand?

What is your mixing problem?

Low capacity, poor mixing, fluctuating green strength, permeability and moisture content, hot sand, high operating and maintenance cost, lost production due to breakdown.

PEKAY CAN IMPROVE THEM ALL WITH THE SIMPLE AND EFFICIENT PEKAY MIXER-MULLER

Find out about Pekay's advanced line of Foundry Equipment. Inquire today about getting the best sand conditioning for the lowest cost.

PEKAY MACHINE & ENGINEERING CO. INC.

865 N. SANGAMON STREET CHICAGO 22, ILLINOIS

Specialists in foundry sand conditioning and handling, slurry systems, engineering and equipment

NAME_____ TITLE_____

COMPANY_____

ADDRESS_____ CITY AND STATE_____

I would like information on:

- ☐ Pekay Mixer Mullers
- ☐ Pekay Coolerator
- ☐ Pekay Sand Systems
- ☐ Pekay Airators
- ☐ Pekay M-T-Matic Buckets

How HOT is your sand?

600°?
USE IMPERIAL SUPER-INSULATED SAHARA BELTING

450°?
USE IMPERIAL INSULATED SAHARA BELTING

300°?
USE IMPERIAL STANDARD SAHARA BELTING

Imperial* Sahara Brand Belts for foundry conveyor and elevator service are job-designed for specific temperatures. High heat resistance is obtained through use of Imperial's exclusive impregnating compounds which are combined with special heat insulating members and especially developed abrasion resistant and high temperature resistant materials. The Imperial INNER-LOCKED* construction gives protection against damage from ripping and abrasion. By installing the right Imperial Belt for your operation you obtain the lowest ultimate hot belt cost. Call in your Imperial sales engineer for recommendations.

*Reg. Trademark of Imperial Belting Co.

You expect MORE from Imperial . . . and you get MORE!

Imperial BELTING CO.
1755 S. Kilbourn Ave., Chicago 23, Ill.

Mail this coupon for FREE Belting Catalog and Engineering Handbook

Please send new Belting Catalog to:

Name_____

Address_____

Circle 561 on Inquiry Card—Page 51

With the Editors

SELL MORE CASTINGS: Reprints have been made of the special 38-page feature "Foundries Can Sell More Castings," which appeared in the May issue. As long as the supply lasts, single copies may be obtained free by writing to the editorial department. Larger quantities of this reprint may be purchased at 50 cents per copy.

—o—

Honor the Dean: Our old friend and onetime contributor to the pages of FOUNDRY, Clement J. Freund, recently received a framed testimonial in honor of his 25 years as dean of the College of Engineering, University of Detroit.

The dean was rather surprised when he walked in on a dinner of members of the faculty and the administration. Donald C. Hunt, director of co-ordination and placement, who acted as toastmaster, had led the dean to believe that the affair was for a group of people interested in making a large contribution to the Engineering College. Rumor has it that the dean was so busy making up a list of equipment that would be useful to the college that he had no suspicions the party was in his honor.

The Very Rev. Colestin J. Steiner, president of the university, was the principal speaker and paid tribute to Dean Freund's many contributions to the Engineering College.

—o—

Excellent Film on Castings: At the recent annual meeting of the Steel Founders' Society of America in Chicago, I was privileged to see a showing of the film "The Big Difference," produced and presented by the Superior Steel & Malleable Castings Co., Benton Harbor, Mich. This film is excellent technically, and surely does a splendid job in showing how steel castings can be designed, produced and tested to assure a superior engineering product.

If you have not seen it, make a special effort to do so. Learn how one foundry uses this film, as one of its promotion tools.

—o—

Army Grabs a Winner: When the 1957 winners of the AFS apprenticeship contest were announced at Cincinnati, our editor in charge of selecting cartoons noticed that Naaman Peterson, Puget Sound Naval Shipyard, Bremerton, Wash. won first place in nonferrous molding. Since we have been receiving cartoons from Naaman Peterson at Bremerton, and good ones too, a letter was dispatched asking the young man for more in-

International Cooperation Administration

CERTIFICATE OF COOPERATION

This certifies that, under the Program of the International Cooperation Administration of the Government of the United States of America in cooperation with other Governments

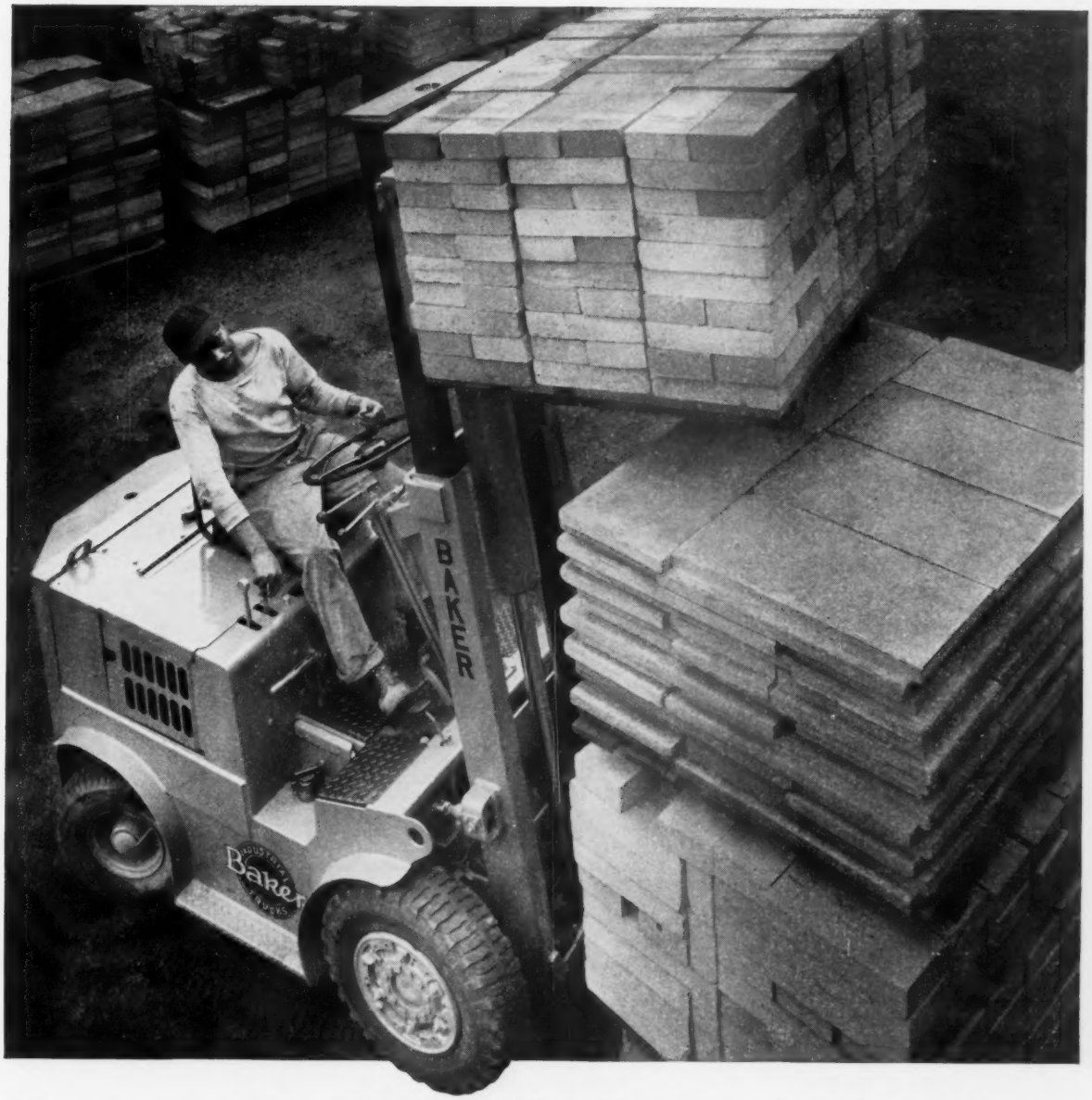
FOUNDRY

has made significant contribution to the achievement of the purposes of this program by furnishing technical assistance to selected representatives of the cooperating countries.

Issued at Washington, D. C.
this 25th day of April 1957

Director

FOUNDRY and a number of organizations serving the foundry industry recently were presented certificates by the International Co-operation Administration for providing technical assistance to groups of foundry visitors from other countries



Maneuverable BAKER Yardloader truck features 48-inch wheelbase with minimum overhang!

This Baker pneumatic-tired gas fork truck has many outstanding features for more efficient, more dependable yard handling –

It is **FAST** – Top speed with load 8.6 mph.

- **COMPACT** – Only 48-inch wheelbase and almost no overhang.
- **MANEUVERABLE** – Turning radius only 79 inches.
- **STURDY**–Welded box-type frame construction. Heavy-duty industrial gas engine. Rugged Timken industrial truck drive axle. Heavy-duty transmission. Rubber mounted trail axle, fully compensating.

It is **SAFE** – Low Center of gravity for stability. Large self-energizing hydraulic brakes. Independent 2-shoe parking brake.

- **EASY TO OPERATE** – Effortless power steering. Convenient, easily manipulated lift and tilt controls. Padded driver seat – offset for better visibility. Unobstructed access for mounting from either side.

Model illustrated is Baker FGF-40 (4,000 lbs. capacity) with truck-loading mast providing 110-inch lift from 71-inch overall height. Standard model has full 130-inch lift. Single or dual drive wheels available. Other YARDLOADERS in capacities from 2,000 to 7,000 pounds. Write for complete information.

Baker®
industrial trucks

THE BAKER-RAULANG COMPANY
1223 WEST 80th STREET • CLEVELAND 2, OHIO
A Subsidiary of Otis Elevator Company

Circle 562 on Inquiry Card—Page 51

BATTERY OF EIGHT STYLE 1303 HAUSFELD "LADLE-OUT" FURNACES

for die casting, shell molding and permanent molding

• The *Hausfeld* stationary or "ladle-out" furnaces are designed for die casting, permanent molding and shell molding. However, this style has been giving excellent results in sand foundries of all sizes, requiring a unit that would not only melt the metal, but hold it at a given temperature to meet production requirements. These furnaces accommodate the latest bowl-type crucibles and with the new Hausfeld Cover-Venting top construction give easier access to the entire bath of metal for dipping out. Capacities: 200 to 1000 pounds.

• Check your present melting costs. If they are high, they may be losing business for you. Let us make recommendations for Hausfeld Furnaces to meet your requirements, and cut your costs. Write for Bulletin 103 on crucible aluminum furnaces, or literature on any non-ferrous melting job. THE CAMPBELL-HAUSFELD CO., 300-320 Moore Street, Harrison, Ohio.

Hausfeld

METAL MELTING FURNACES

formation about himself. We recently received the accompanying snapshot from his mother and the following letter from Naaman:

"Your letter of May 13, 1957, was forwarded to me at Fort Ord, Calif. where I am presently a patient in the Fort Ord Hospital.

"I will try to give you some biographical information. Am 22 years old. I was born in Salina, Kans., but have lived for the last seven years in Washington where I was very fortunate in receiving a foundry apprenticeship at the Puget Sound Naval Shipyard. I managed to serve

three years and nine months of this apprenticeship before going into the Army where I am at present.

"I have been cartooning in my spare time for about as long as I've been working in the foundry. Have sold quite a few cartoons to FOUNDRY as well as other national magazines. Right now am anxious to get out of the Army, finish my apprenticeship and sell more cartoons.

"I certainly appreciate your interest. This letter serves another purpose—to let you know why you haven't received any cartoons from me and why you won't for a few months. The Army just doesn't give you time for such things."

—o—

Author, Author: Over a period of several years, the *Gray Iron News*, publication of the Gray Iron Founders' Society, has published a series of short articles entitled "Problems of a Small Jobbing Shop by A Man Who Operates One." Recently I came across a reprint of the series which included the interesting information that the "Man Who Operates One" is none other than Summerfield Brunk, president, Headford Bros. & Hitchins Foundry Co., Waterloo, Iowa.

Summer has a free and easy style that really carries a punch. Much can be learned from these descriptions of his experiences. F.G.S.

Circle 563 on Inquiry Card—Page 51

Circle 564 on Inquiry Card→

At Magcobar's Des Plaines, Illinois, laboratory, A. H. Zrimsek uses modern methods for foundry sand research.

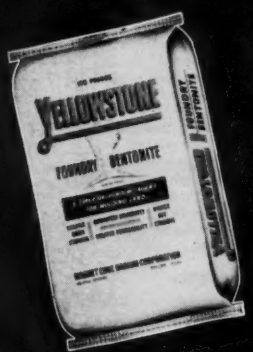
SCIENCE and SAND

. . . Recipe For Progress

In new laboratories at Des Plaines, Houston and Greybull Magcobar technicians are busy with silica, bentonite, water and a host of other ingredients, taking the guesswork out of sand formulas. Applying modern research methods, these scientists are *proving* the "hows" and "whys" of foundry sand practice.

Magcobar invites the technical and research groups of the American Foundries to use Magcobar facilities for the solution of various industry-wide problems relating to sands.

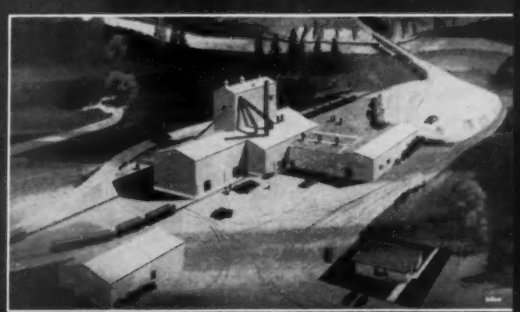
Write Des Plaines for our latest foundry technical bulletins. Look to Magcobar, producers of YELLOWSTONE bentonite, for further revealing recipes for progress.



Magcobar
YELLOWSTONE
BENTONITE

MAGNET COVE BARIUM CORPORATION
Des Plaines, Illinois, 576 Northwest Highway
Houston, Texas, P. O. Box 6504
Greybull, Wyoming

Magcobar technicians in the company's big research laboratories in Houston strive for constant improvement of Magcobar products.



This Magcobar plant at Greybull, Wyoming, where YELLOWSTONE is mined and processed, is the world's largest producer of bentonite, and includes a complete quality-control laboratory.

Planet belt conveyor transferring briquets to *adjustable* boom conveyor.

This Planet Conveyor Handles Briquets *with kid gloves*

At one of the world's largest automotive foundries, this Planet boom-type belt conveyor makes the vertical adjustment necessary to lower briquets to yard storage level with a minimum of breakage.

The foundry pours over 1,000 tons of gray iron in a 16 hour day. A good percentage of the pouring is cylinder iron which averages 1,000 lbs. of cast iron briquets in each 4,000 lb. metal charge for the cupola.

In the cupola the tremendous air blast delivered by three centrifugal fans, each with a 17,500 cfm rated capacity at 40 oz. pressure, **makes short work of briquet fragments.** Inasmuch as the cast iron briquets make up almost 25% of the metal charge, the savings in keeping briquets intact is considerable . . . results in more metal, less waste.

You can save money with Planet foundry automation. Whatever your specific problem, within the foundry or in yard storage, Planet foundry specialists can cut your operating costs. Start the ball rolling today with a letter or phone call. Phone IVanhoe 4-9433.

PLANET CORPORATION
1818 SUNSET AVENUE
LANSING, MICHIGAN

- CONVEYORS
- ENGINEERED SYSTEMS
- FOUNDRY EQUIPMENT
- AUTOMATION
- STEEL FABRICATION

"IT PAYS TO PLAN WITH PLANET"

CALENDAR of Meetings

Aug. 19-24—International Foundry Congress, Parliament Bldg., Stockholm, Sweden.

Sept. 9-13—Instrument Society of America, 12th annual instrument automation conference, Public Auditorium, Cleveland.

Sept. 17-20—American Die Casting Institute, annual meeting, Edgewater Beach Hotel, Chicago.

Sept. 23-24—Steel Founders' Society of America, fall meeting, Homestead, Hot Springs, Va.

Sept. 26-28—Missouri Valley Regional Conference, sponsored by St. Louis, Tri-State and Mo-Kan chapters, AFS, and Missouri School of Mines Student Chapter, Missouri School of Mines and Metallurgy, Rolla, Mo.

Oct. 3-4—Refractories Institute, fall meeting, Grand Hotel, Point Clear, Ala.

Oct. 3-4 — Michigan Foundry Conference, sponsored by Central Michigan, Detroit, Saginaw Valley and Western Michigan chapters, AFS, in co-operation with Michigan State University and University of Michigan, Kellogg Center, Michigan State University, East Lansing, Mich.

Oct. 9-11—Gray Iron Founders' Society, annual meeting, Drake Hotel, Chicago.

Oct. 12-15—Conveyor Equipment Manufacturers Association, annual meeting, Grand Hotel, Point Clear, Ala.

Oct. 17-18—Magnesium Association, annual convention, Biltmore Hotel, New York.

Oct. 17-19—Foundry Equipment Manufacturers Association, annual meeting, Greenbrier, White Sulphur Springs, W. Va.

Oct. 18-19—Northwest Regional Foundry Conference, Hotel Vancouver, Vancouver, B. C.

Oct. 18-19—New England Regional Foundry Conference, Massachusetts Institute of Technology, Cambridge, Mass.

Oct. 21-25—National Safety Council, national safety congress and exposition, Conrad Hilton Hotel, Chicago.

Oct. 24-25—Ningara Frontier Regional Foundry Conference, Statler Hotel, Buffalo, N. Y.

Oct. 31-Nov. 1—Metals Casting Conference, Purdue University, Lafayette, Ind.

Nov. 2-8—American Society for Metals, national metals exposition and congress and 2nd world metallurgical congress, International Amphitheatre, Chicago.

Nov. 7-8—National Foundry Association, annual meeting, Waldorf-Astoria Hotel, New York.

Nov. 11-13—Steel Founders' Society of America, technical and operating conference, Hotel Carter, Cleveland.

Nov. 19-21—Investment Casting Institute, annual fall meeting, Sheraton Hotel, Chicago.

Dec. 4-6—American Institute of Mining, Metallurgical and Petroleum Engineers, electric steel furnace conference, Penn-Sheraton Hotel, Pittsburgh.

1958

Jan. 27-28—Industrial Heating Equipment Association, annual meeting, Penn-Sheraton Hotel, Pittsburgh.

Feb. 9-14—American Society for Testing Materials, committee week, Statler Hotel, St. Louis.

Mar. 12-13—Foundry Educational Foundation, college-industry conference, Hotel Statler, Cleveland.

Mar. 17-18 — Steel Founders' Society of America, annual meeting, Drake Hotel, Chicago.

May 12-16—American Society for Metals, 1st Southwestern metal congress and exposition, Automobile Bldg., Dallas, Tex.

May 22-28—American Foundrymen's Society, 62nd annual convention and exhibition, Public Auditorium, Cleveland.

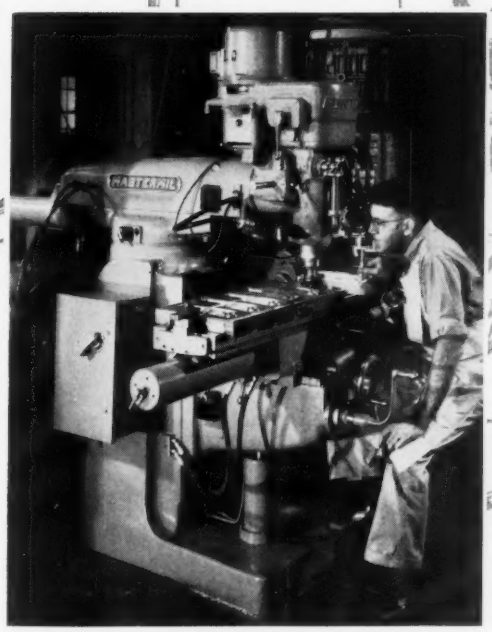
June 9-12—National Materials Handling Exposition, Public Auditorium, Cleveland.

June 9-13—International Automation Exposition and Congress, Coliseum, New York City.

June 22-27—American Society for Testing Materials, annual meeting, Statler and Sheraton-Plaza hotels, Boston, Mass.

←Circle 565 on Inquiry Card

FOR QUALITY THAT STANDS CLOSE INSPECTION



The accuracy of this Gorton Mastermil is supplemented by a True-Trace hydraulic tracing system for the most modern and efficient duplicating action obtainable. Advancements such as this symbolize the continuing Pyle development program which maintains our reputation for finest quality patterns at economical cost and assures prompt shipment as well.

. . . we suggest you look to Pyle! Our business has been built serving customers who accept nothing less than perfection.

Here every wooden model is prepared in flawless detail by men averaging 19 years of patternmaking experience. Our integrated foundry is designed, equipped and operated exclusively for pattern production. We have the lathes, radial drills, milling machines, planers and hydraulic or automatic duplicators to meet your every need. Meticulous hand finishing and uncompromising inspection guarantee your complete satisfaction.

For fifty years we've made patterns for America's most quality-conscious firms. May we have the pleasure of making them for you?

PYLE

PATTERN AND MANUFACTURING COMPANY

Muskegon Heights, Michigan

Circle 566 on Inquiry Card—Page 51

YOU'LL DO A BETTER JOB

with **H. V. ADAMS DESIGNED**

HIGH EFFICIENCY FOUNDRY TOOLS

"UNIVERSAL FREE WHEELING"

FOUNDRY SAND RIDDLE

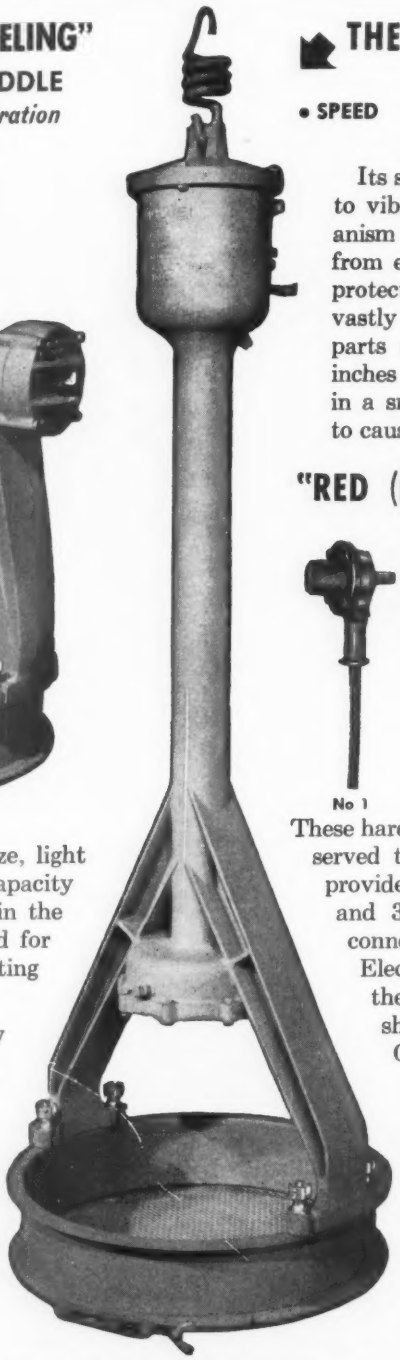
with the Double Eight Vibration

Because of its convenient size, light weight and good riddling capacity it long has been a favorite in the foundry. It also can be used for mixing core sand or for sifting sand directly into molds.

The mechanism is entirely enclosed protecting it from harmful dust and grit.

The main frame is cast in very strong tough aluminum.

It uses quick change ferruled sieves with 20 in. diameter sifting area. There are no loose wires to harm hands.



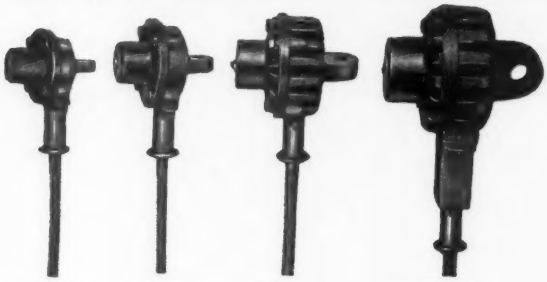
THE "ROTOPLANE" SPEED SIFTER

WILL GIVE YOU

• SPEED • ECONOMY • SAFETY • LONGER LIFE
• GREATER SIFTING CAPACITY

Its sturdy one-piece frame and long shaft add to vibration effectiveness. The sealed-in mechanism assures protection of motor and bearings from exposure to dust and grit. This sealed in protection and "Rotoplane's" free-rotary action vastly increase bearing life. No exposed moving parts endanger the operator. Sieves have 20 inches diameter clear sifting area—are mounted in a smooth steel ferrule with no jagged edges to cause dangerous cuts and scratches.

"RED (Devil) ELECTRIC" VIBRATORS



No 1 No. 2 No. 5 No. 9

These hard hitting Adams designed Vibrators have served the foundries for over 30 years. They are provided with a 6 foot 3 wire authorized cable and 3 wire grounded connector which, when connected with our 3 wire grounded Red Electric Knee Switch, automatically grounds the vibrator protecting the worker from shock. The vibrators have passed the U. S. Government code inspection.

Other Foundry Products:

- No. 11 NOISELESS TYPE VIBRATOR
- A-20 ELECTRIC VIBRATOR
- RED ELECTRIC KNEE SWITCHES
- "ROTO" ADJUSTABLE BIN VIBRATOR
- 2 MIN. UNIVERSAL FINENESS TEST SIFTER.
- UNIVERSAL TRIPOD CARRIER

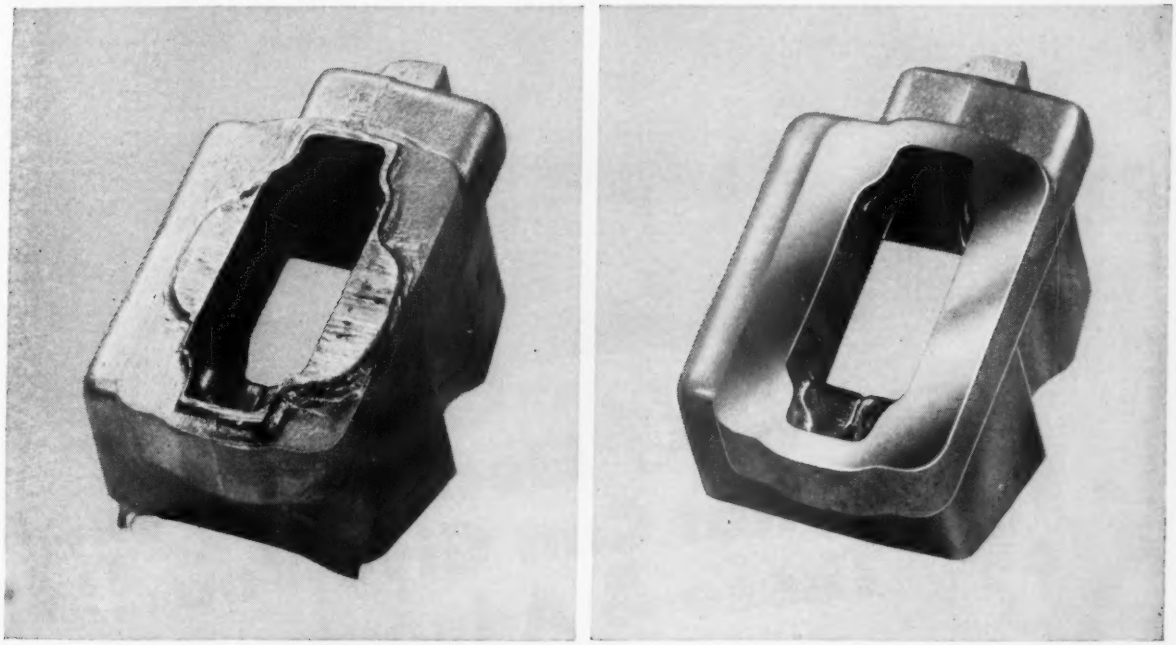
ORDER ALL SIFTERS AND VIBRATORS WITH GROUND WIRE!!

FOUNDRY SUPPLIES MANUFACTURING CO., NOT INC.

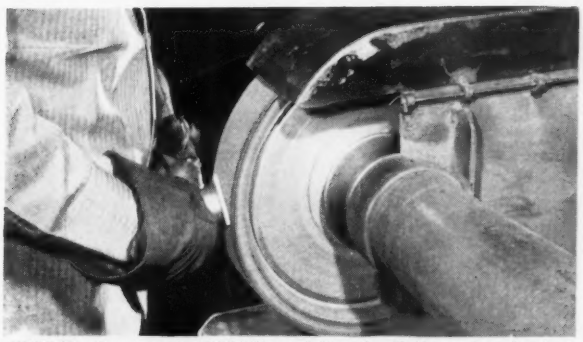
2221 Orchard Street - Chicago 14, Illinois

Established 1918 Cable Address: "Rotoplane Chicago" H. V. ADAMS, Mgr.

3M METHOD—better from start to finish



Aluminum foundry boosts production 35% with 3M Abrasive Belts!



5000 Castings per belt! 3M Coated Abrasive Belts are long-lasting production tools, designed to do the best possible grinding and finishing job at lowest cost to you.

Aluminum Castings Corp., Norwalk, Connecticut obtained this production increase when they switched to the 3M Method of grinding and finishing non-ferrous metal castings. This foundry found grinding wheels could turn out only 150 aluminum muffler units per hour . . . this method produced unsatisfactory finishes, high unit costs. Converting to the 3M Method, using Grit 24 Three-M-ite Cloth Belts, jumped production to 200 finished units per hour, with better and more consistent finishes and lower unit costs.

You can benefit from the 3M Method, too, no matter how tough your grinding problem. Your 3M Representative is an abrasives expert who can show you how 3M Coated Abrasives can remove gates, risers and burrs faster, more economically than the abrasive you are now using. Send coupon today for facts.

3M ABRASIVES

Made in U.S.A. by Minnesota Mining and Mfg. Co. General Offices: St. Paul 6, Minn. In Canada: P.O. Box 757, London, Ontario. Export Sales Office: 99 Park Avenue, New York City.

PRODUCT OF 3M COMPANY RESEARCH

Send today for FREE Booklet!

MINNESOTA MINING AND MFG. CO.
Dept. CN-77, St. Paul 6, Minn.

☐ *Send me free booklet on grinding non-ferrous metals.*
☐ *I'd like to talk to a 3M Representative.*

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COMPANY_____

CITY_____ ZONE_____ STATE_____

FOUNDROMATIC
Dielectric
SAND CORE OVEN

The *Only* Electronic Oven That Can Give You These 4 Advantages

- **Exact Quality Control** . . . Adjustable electrode control permits correct compensation for physical variance in cores. Burning and incomplete baking are eliminated, even when cores have very thick or very thin sections.
- **"Load Master" Protection** . . . An automatic grid control assures correct drive to the oscillator tube regardless of oven load. Automatic conveyor control prevents electrical overload by controlling belt travel when load is too great for normal operation.
- **Simplified Operation** . . . "Tell-All" control panel, at eye level, enables operator to keep on top of the complete operation at all times — to maintain top quality with maximum speed and accuracy.
- **Extra Safety** . . . The *Foundromatic* core oven provides maximum safety for operator and machine. Metal cabinet is designed to trap radiation. Door interlocks shut off power when cabinet is opened for inspection.

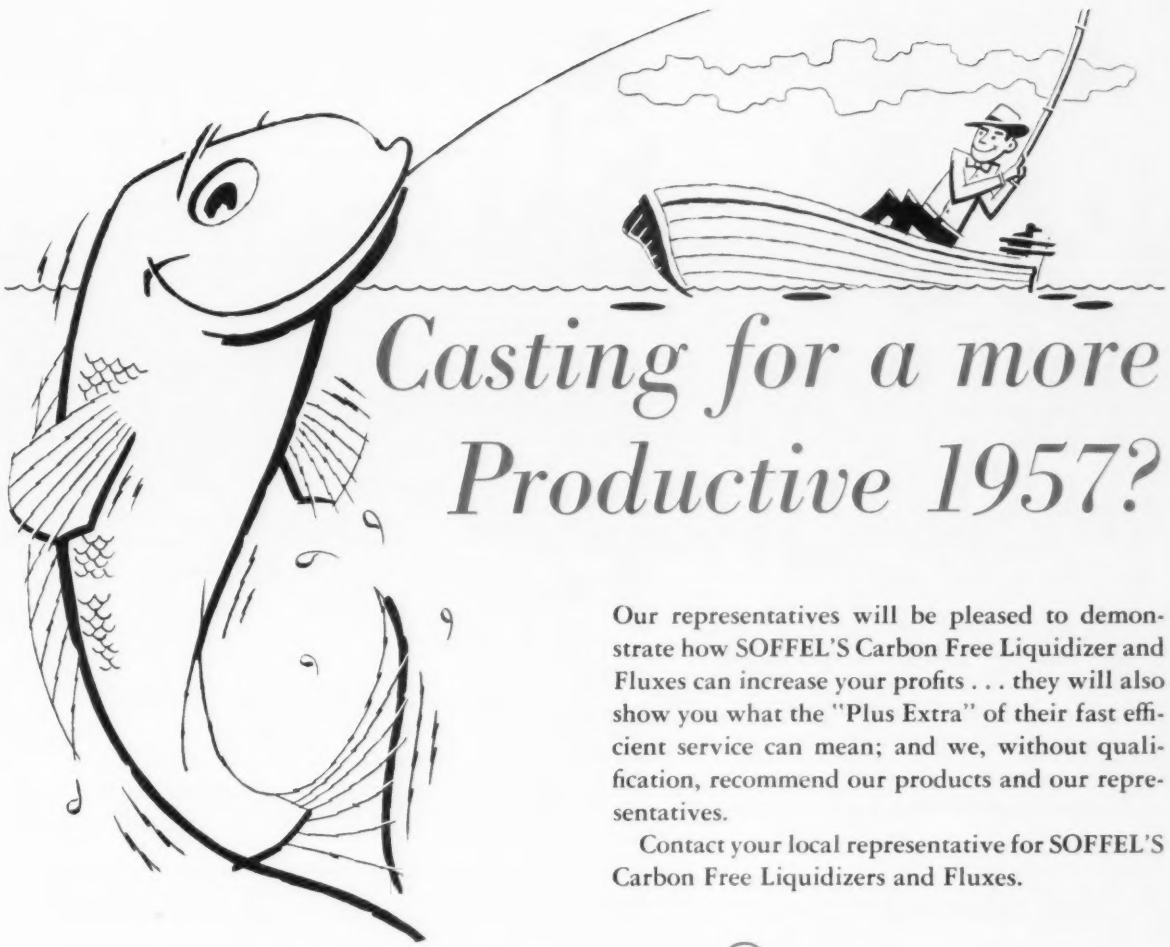
Foundromatic is an Allis-Chalmers trademark.

Foundry Men — Be sure you get the fast production and reduced core costs possible with the *Foundromatic* sand core oven. For the complete story, see your A-C representative or write Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wisconsin. Ask for new Bulletin 15B7306C.

ALLIS-CHALMERS

A-C ALLIS-CHALMERS

A-5326



Casting for a more Productive 1957?

Our representatives will be pleased to demonstrate how SOFFEL'S Carbon Free Liquidizer and Fluxes can increase your profits . . . they will also show you what the "Plus Extra" of their fast efficient service can mean; and we, without qualification, recommend our products and our representatives.

Contact your local representative for SOFFEL'S Carbon Free Liquidizers and Fluxes.

Phone or Write Your Nearest PMP CO. Distributor:

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Milwaukee Chaplet & Supply Corp.
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Smith-Sharpe Company
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PHONE: University 5-0501

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PHONE: Olympic 8-3300

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"WORLD'S LARGEST MANUFACTURER OF FLUXES, PURIFIERS AND EXOTHERMIC COMPOUNDS FOR ALL METALS AND ALLOYS"

Make your x-ray films more revealing

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In radiographic work . . . every minute detail and shading counts. For consistently uniform results and revealing contrasts, you can depend on the long life and efficiency of ANSCO'S developers and fixers. And isn't it nice to know the best costs no more.

ANSCO LIQUADOL X-RAY FILM DEVELOPER
Convenient liquid developer in concentrated form gives highly uniform results. Easily diluted with 3 parts water, Liquadol brings out maximum definition, contrast and density in radiographs.

ANSCO LIQUADOL REPLENISHER
Designed especially for use with Liquadol Developer. When added in amounts sufficient to sustain proper solution level, Liquadol Replenisher increases working life of original solution—developing time remains unchanged. A real economy in greater production of uniformly processed radiographs.

ANSCO LIQUAFIX FIXING SOLUTION
Reduces clearing time of X-ray films, giving greater and faster production. Liquafix is a single solution fixer-hardener that has only to be diluted with water to provide positive fixing action. Actually processes more films than powder-type formulas.

ANSCO POWDERED X-RAY FIXER
An easy-to-prepare single mix powder formula. Ansco Powdered X-ray Fixer has unusually high capacity, fast fixing characteristics and good hardening properties.

AVAILABILITY

	To Make	*To Make*	*To Make*	*To Make*
LIQUADOL DEVELOPER	1 gallon	5 gallons	20 gallons	200 gallons*
LIQUADOL REPLENISHER	1 gallon	5 gallons	20 gallons	200 gallons*
LIQUAFIX FIXER	1 gallon	5 gallons	.....	400 gallons
POWDERED X-RAY FIXER	1 gallon	5 gallons	20 gallons	50 gallons

**Supplied in 50 gallon size collapsible rubber drums.*

A complete line of Ansco X-ray products is carried by your local X-ray equipment dealer. For further information, or if you would like our Ansco representative to call on you, write to Ansco X-ray Sales Department, Charles Street, Binghamton, N. Y.

Ansco BINGHAMTON, NEW YORK • *A Division of General Aniline & Film Corporation*

Circle 571 on Inquiry Card—Page 51

NICHOLLS "AIROMATIC"

Automatically, completed mold is turned over and transferred to conveyor. Just one of the better-than-human automatic operations.

You Get Consistent High Quality with Nicholls Fully-Automatic Push-Button Molding Machines

Get a continuous flow of molds—better molds. Eliminate money-squandering risk and error. Our new No. 24 Type C heavy-duty molding machine culminates almost 50 years of experience to give you better molds at a lower cost—automatically. And automatically, profits increase as costs of production and materials decline—thanks to Nicholls. Write us for details about Nicholls heavy duty molding machines.

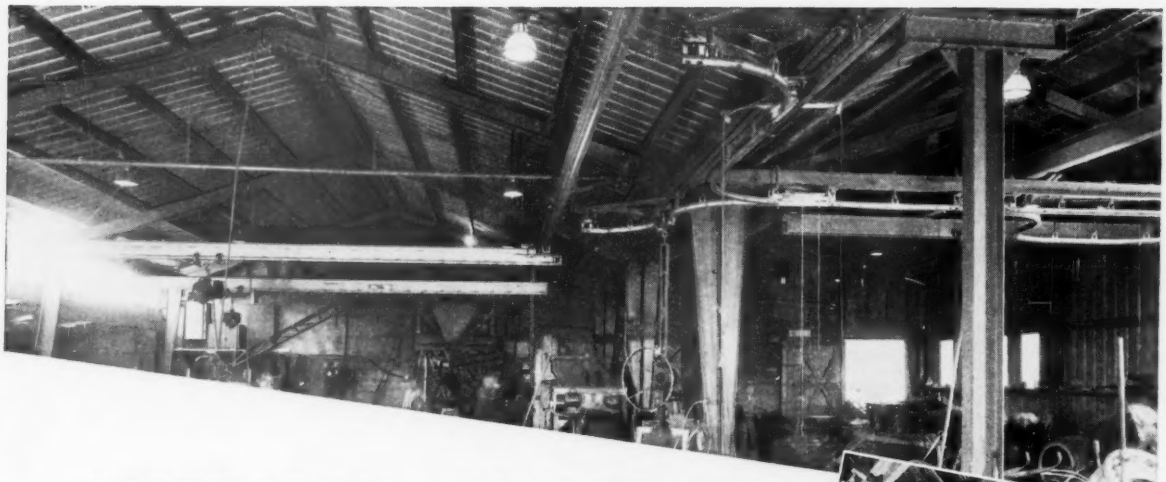
Cost sheets too, are in better shape, when you mold on Nicholls machines.

Now Study These Cost-Cutting Advantages

- Pneumatic Pattern Draw.
- Air-Operated Car-Type Squeeze Head.
- Built-in Flask, Roll-in, Roll-out Device.
- Sand Hopper That Measures.
- Flask Feed-in Elevator.
- Flask Indexing Device.
- Sand Spill Upset.
- Mold Turnover and Transfer.

WM. H. NICHOLLS CO., INC., Richmond Hill 18, Long Island, N. Y.

NICHOLLS

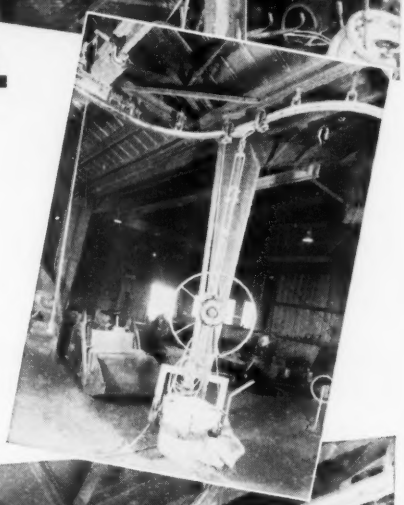


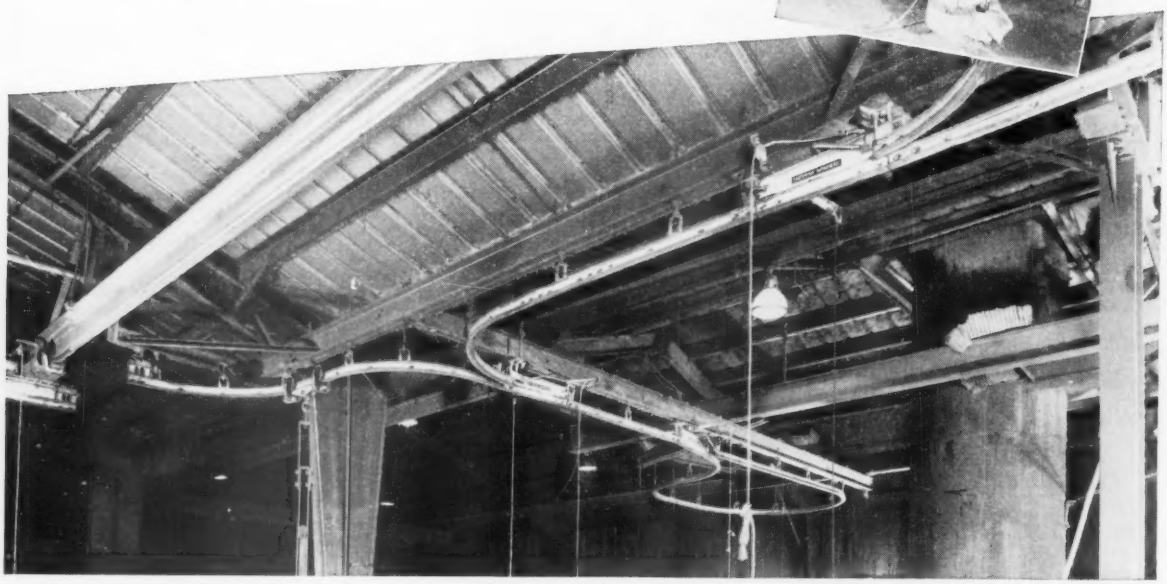
AMERICAN MONORAIL
in Rigid Frame Buildings

A low cost foundry operation can be maintained by application of American MonoRail track and crane systems within a rigid frame type building.

American MonoRail advantages include easy handling, smooth travel, power operation, safe interlocking for loads up to 5 tons.

This is another application of "know-how" by American MonoRail engineers. Let them help solve your problem. Write for Bulletin BPD-1.





Photos courtesy of Kramer Bros. Foundry, Dayton, Ohio

Member of Materials Handling Institute • MonoRail Association

AMERICAN MONORAIL COMPANY

13104 ATHENS AVENUE, CLEVELAND 7, OHIO (IN CANADA—CANADIAN MONORAIL CO., LTD., GALT, ONT.)

Circle 573 on Inquiry Card—Page 51

Powder-washing with the
OXWELD C-62 Blowpipe—fast,
efficient, economical.

Another Foundry Goes Modern!

No costly, time-consuming chipping and grinding here.

This foundry has gone modern . . . with powder-washing.

Powder-washing is the fastest, most efficient way to remove fins, pads, sand inclusions, and other defects from casting surfaces.

THE RESULT? *Increased production and profits!*

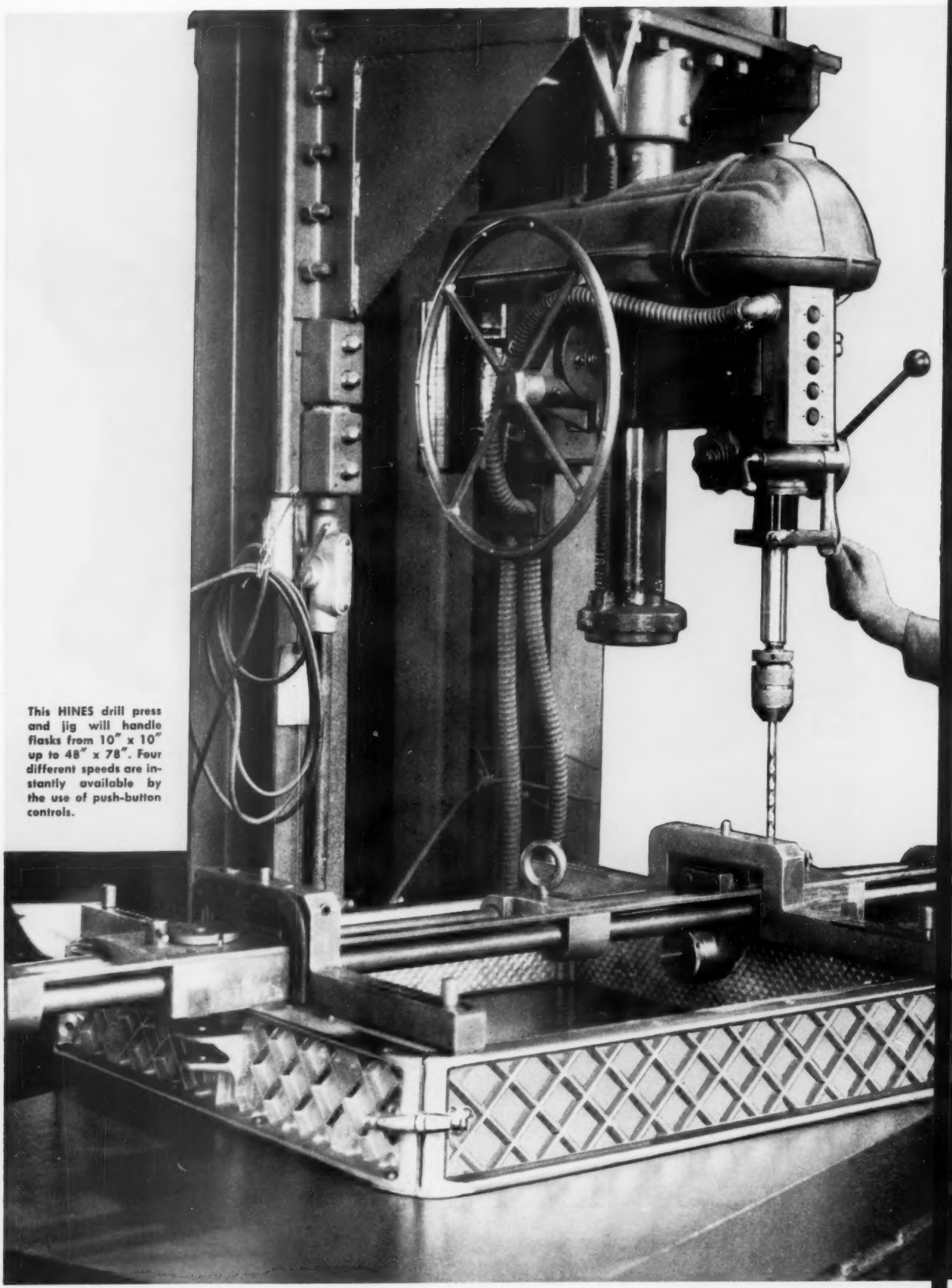
Call your nearby LINDE representative or write for more information today.

LINDE COMPANY DIVISION OF **UNION CARBIDE** CORPORATION

30 East 42nd Street, New York 17, N. Y.

"Linde," "Oxweld," and "Union Carbide" are registered trade-marks of Union Carbide Corporation.

Circle 574 on Inquiry Card—Page 51



This HINES drill press and jig will handle flasks from 10" x 10" up to 48" x 78". Four different speeds are instantly available by the use of push-button controls.

PERFECT ALIGNMENT DOESN'T JUST HAPPEN!

Here's how perfect alignment of cope and drag is "built" into HINES FLASKS.

Here at HINES, we of course know that accurate pins and bushings are necessary for perfect alignment of cope and drag flasks. But, what's even more important is *how* these pins and bushings are installed *on the flask.*

That's why HINES uses a specially-built machine to drill, ream, counterbore and spot-face both cope and drag, for the installation of HINES pins and bushings. The HINES-designed jig is positioned with extreme accuracy by means of guide pins that bear on all four sides of the flask. Two micrometers, at the ends of the jig, control the locating bars so we can drill to ±.003 accuracy. The result — perfect alignment of cope and drag. And, with HINES hard-chrome-plated pins and bushings, you're assured of long, uninterrupted production — smooth, fast pattern draw—free of "chatter", free of "sticking". Remember, too, HINES hard-chrome-plated pins and bushings *won't rust*—flasks are ready for use, no matter how long they've been on the shelf.

So, don't take chances! Specify HINES micrometer-machined flasks! Specify HINES hard-chrome-plated pins and bushings!

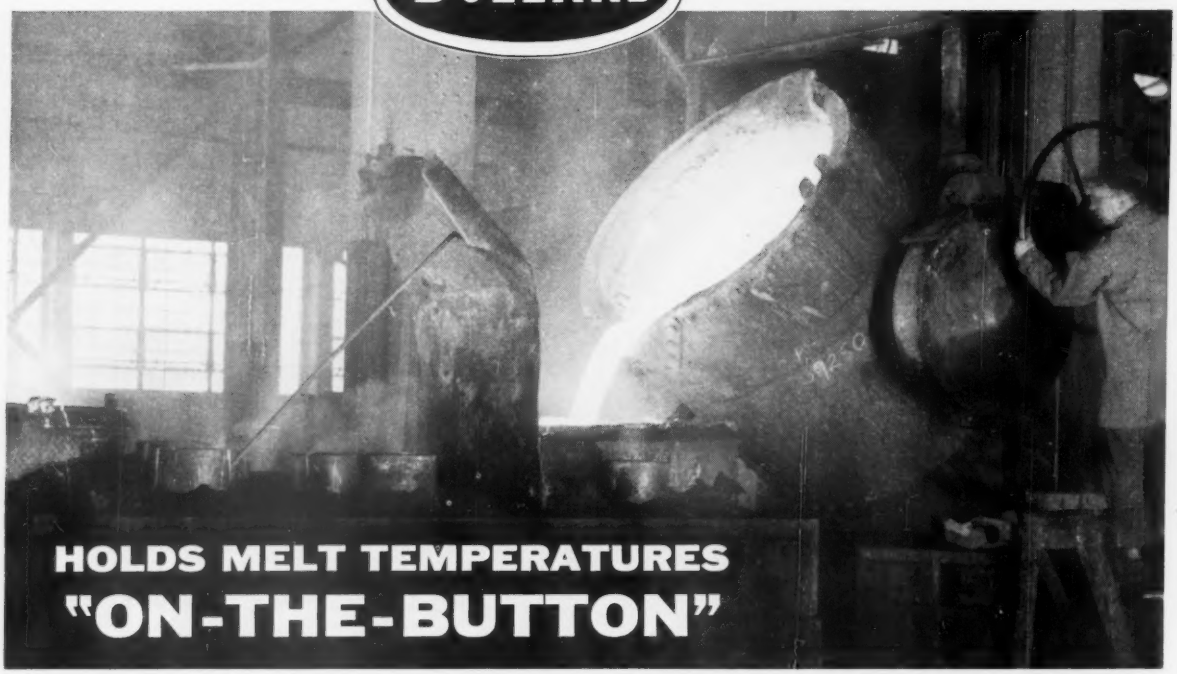
THE HINES FLASK CO.

3431 WEST 140TH STREET

CLEVELAND 11, OHIO

HINES POP-OFF FLASK FEMA

Ultra-modern **BULLARD** foundry



HOLDS MELT TEMPERATURES "ON-THE-BUTTON"

▲To get the best possible machine tool castings, The Bullard Company uses Foxboro Air Weight Control in their new 7-million dollar foundry. Ladle is pouring a 29,000-lb. casting.

...with Foxboro Air Weight Control

At the new multi-million-dollar Bullard Company foundry in Bridgeport, Conn., Foxboro Air Weight Controllers automatically help produce top quality castings for world-famous machine tools.

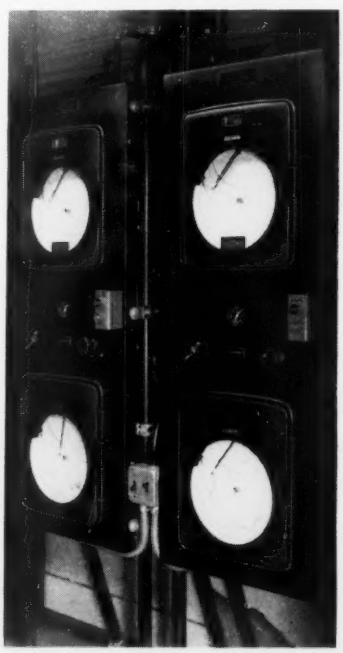
"We set them in the morning and forget them", says Stanley H. Bullard, foundry superintendent. "And they hold the set point all day — right on the button."

Foxboro Air Weight Controllers meter blast by *weight of air* instead of volume. They help cut fuel costs . . . practically eliminate pigging . . . provide accurate chart records of the melt. Variations in temperature, barometric pressure, cupola resistance, and line voltage are compensated automatically.

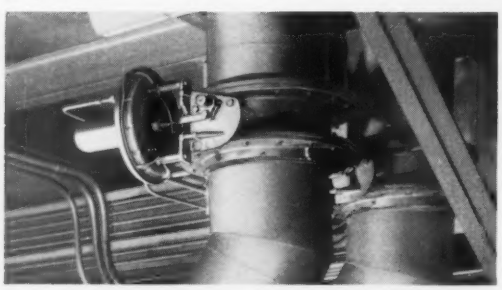
Foxboro Air Weight Controllers have been foundry-proved in over 1700 installations. See what they can do for you by writing for Bulletin 10-10, or by asking your nearby Foxboro Field Engineer. **The Foxboro Company, 327 Neponset Ave., Foxboro, Mass., U. S. A.**

FOXBORO **AIR WEIGHT CONTROL**

REG. U. S. PAT OFF.



▲The key to better castings at The Bullard Company is this control panel, serving two 12-ton per hour cupolas. Top instruments are Model 40 Air Weight Controllers. Below are continuous Windbox Pressure Recorders.



Foxboro Butterfly Valve installed in one of the 24-inch blast lines. Valve position is controlled by Foxboro Air Weight Controllers shown at right.

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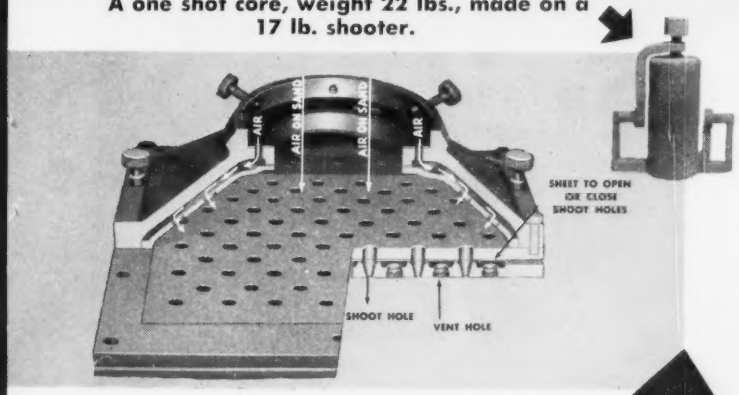
Circle 577 on Inquiry Card→

NOW A NEW UNIVERSAL HEAD on the DAVENPORT HANSBERG *Shooter*®

A one shot core, weight 22 lbs., made on a 17 lb. shooter.



Cross section of the new universal head which makes this great machine even greater.

This new universal head saves change-over time, making all "DAVENPORT" Shooters ideal for production and jobbing foundries. Notice: the extra air chamber in the shoot-head pushes the sand into the furthest end of the core-box assuring a perfect sand distribution.

How "DAVENPORT" Shooter works:

A fixed, limited amount of compressed air is stored in a reservoir directly behind the sand, and is released instantaneously through a large valve surrounding the sand chamber. The explosively expanding air propels a "shot" of sand instantaneously into the corebox and gives a very compact core. Therefore, the sand is pushed into the cavity by air instead of being blown in with air, as in the case of core-blowers. Cores can be shot in wooden boxes without special attachments and without causing wear because there is no sand-blasting action. Venting of boxes is greatly simplified since the propelling air does not mix with the sand. The only venting required is for the atmospheric air in the box.

Perfect for CO_2 Process

Oil Sands, Molding Sands, Sands for CO_2 Process, Shell-Molding Resin Sands, Resin Cereal Core Sands, Pelleted Pitch Core Sands, etc., which are either difficult or impossible to blow, can be handled by shooting.

Advanced Method of Making Cores

This patented method of shooting cores is the advanced method of making foundry cores more uniform, in less time — at a lower cost. Write or wire for more information pertaining to your individual requirements. Learn about the difference between Blowing and Shooting and, more specifically, learn why claims of shooting with a core-blower are erroneous.

DAVENPORT MACHINE AND *Foundry Company*

Davenport, Iowa, U.S.A.

"DAVENPORT" Hansberg Shooters are built in 4 sizes with core capacities from 4 to 88 pounds. All Shooters are available with manual or automatic controls.

Large and intricate cores are cured in minutes with the

New Sodium Silicate-CO_2 Process

Elimination of oven baking speeds production ...cuts costs

Only a few minutes are required to cure green cores when the new sodium silicate-carbon dioxide process is used. Cores and molds are ready for the metal pouring line immediately after CO_2 curing. No time-consuming oven baking is required. The production cycle is faster . . . costs are lower.

In one foundry, six baking ovens were scrapped after the sodium silicate-CO_2 technique was given a trial. Another foundry reports that an overall cost saving of 21% has been achieved since switching from oven curing to the CO_2 process.

In addition, foundries using the new system find that CO_2-cured cores resist breakage, hot tears and cracks . . . can be made to extremely close tolerances. Foundry personnel like the new process because it has no toxic fumes or objectionable odors.

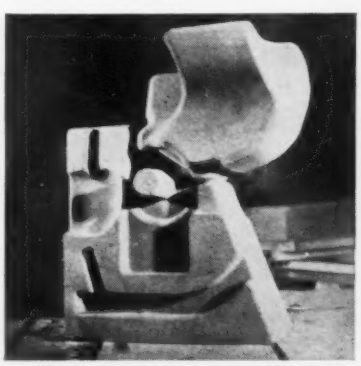
High-quality Du Pont sodium silicate is available in formulated products for CO_2 systems from foundry supply houses throughout the country.

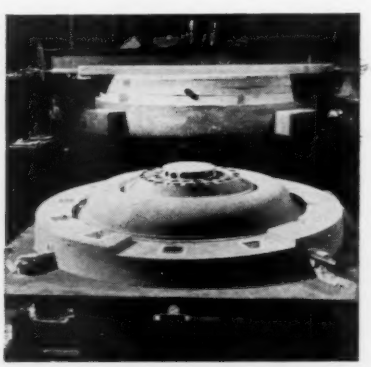
Binder formulations vary for specific needs and foundrymen prefer to rely on the advice of their foundry supply representatives for recommendations.

E. I. DU PONT DE NEMOURS & CO. (INC.)
Grasselli Chemicals Department
Wilmington 98, Delaware

Fine core sand and a binder based on Du Pont sodium silicate are mixed thoroughly in a standard muller (left). Mixture is hand-tamped into form (right) then packed tightly with pneumatic rammer.

Core maker prepares to inject core with carbon dioxide (left). In the chemical reaction that results, the silicate is converted into a strong gel that binds sand grains together firmly. Cured core (right) is strong, yet will collapse easily after casting.





Intricate core for an automotive casting (left) is cured and ready for the metal pouring line in 2 to 3 minutes. Core for large industrial torque converter (right) is cured and ready for use in a few minutes. Oven curing would take several hours to do same job.

DU PONT
REG. U.S. PAT. OFF.

SODIUM SILICATE

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

In This Leading Automotive Foundry, 500 to 600 tons of iron go through each of the big receiving ladles daily. A rammed lining of Norton ALUNDUM refractory cement, six inches thick, lasts 10 to 12 weeks, handling an average of 15,000 tons. Only occasional patching is required. The two-ton Crane monorail ladles handle 240 tons per day. Their linings of ALUNDUM cement, four inches thick, average 54 days of service life for a total tonnage of 13,000. About half these smaller ladles require patching, with the same Norton refractory material, after an average of 36 days' service.

Can your linings take this punishment?

Proof that ALUNDUM cement gives long life under heavy duty*

High-melting, long-lasting ALUNDUM cement is just one of many Norton Rx's — refractories *engineered and prescribed* for longer, lower cost service across the range of furnace applications. Others include CRYSTOLON*, MAGNORITE*, and FUSED STABILIZED ZIRCONIA.

For Rx's that will help maintain hot metal schedules and reduce shut-downs in your own furnaces, call in your Norton Refractories Engineer. Or write to NORTON COMPANY, 500 New Bond St., Worcester 6, Mass.

Another Tough Spot for linings is this trough, in the same big automotive foundry. From 500 to 600 tons of molten iron pour through the trough every day. Bottom and sides, from dam to trough end, are lined with ALUNDUM cement. Average lining life is 11 to 12 days, during which approximately 6,000 tons of iron passes through.

NORTON

REFRACTORIES

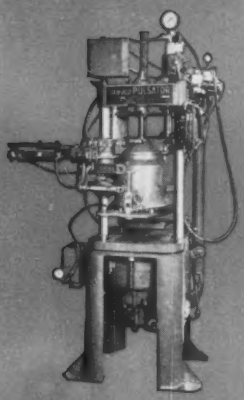
Engineered... Rx ...Prescribed

Making better products... to make your products better

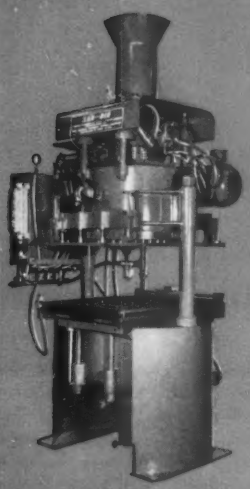
NORTON PRODUCTS: Abrasives • Grinding Wheels • Grinding Machines • Refractories
BEHR-MANNING PRODUCTS: Coated Abrasives Sharpening Stones • Behr-cat Tapes
*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries

SAN-BLO®

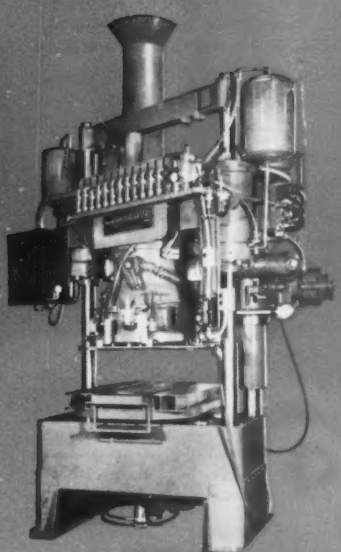
dedicated to



for cores weighing
up to 40 lbs. each



for cores weighing
up to 150 lbs. each



for cores weighing
up to 250 lbs. each

SAN-BLO . . . first with these advancements . . .

- ☆ ***Motor-driven agitator!***
- ☆ ***"Aerating" air circuit!***
- ☆ ***Single, automatic control!***
- ☆ ***Automatic, electric, blow-cycle timing!***
- ☆ ***"LPP" (low pressure prefill)!***
- ☆ ***"Pulsating" blow action!***
- ☆ ***"Quick-Change" blow and vent plate assembly!***

The above SAN-BLO developments, for the first time, provided for the blowing of *any* core sand mixture, in *either* wooden or metal core boxes, with *minimum* core box wear, *without* changing blow head and with *minimum* time changing core boxes—and provided for blowing *all* cores with *equal efficiency*, whether large or small, simple or complex, of heavy or light sand. No other core making machine has contributed so much, for the advancement of automatic core production!

Manufactured by *San-Blo Division*

advancement in core production!

SAN-BLO introduced the first "mechanized" sand chamber, or blow head, with motor-driven agitator and "aerating" air circuit, to eliminate "flowability" as a critical factor in the preparation of core sand mixtures. These exclusive features permit the use of the same sand chamber for producing both small and large cores, eliminate "piping" and permit the proper location of blow holes in the blow plate, to minimize horizontal sand travel in the core box.

SAN-BLO pioneered automatic core blowing to speed up and standardize the rate of core production, utilizing electronic devices to provide single-push-button control and electric timing of the blow cycle. Automatic, electric controls make obsolete the manual-control operation of core machines.

SAN-BLO perfected "LPP" (low pressure prefill) to minimize core box wear and subsequent repairs. It developed "Pulsating" blow action to permit the safe blowing of wooden core boxes without the need for special, protective rigging. These two remarkable techniques, plus the "mechanized" blow head, make possible the full utilization of compressed air as a "lubricant" for the movement of sand from blow head to core box. They first provide for the filling of the core box with sand propelled by only a few pounds air pressure (LPP), followed immediately by the introduction of sand under pulsating, full line pressure, to pack the sand to proper hardness. No other "blow" or "shoot" can match this method of core making, in providing both core box protection and correct packing of the sand.

Another SAN-BLO development was the "Quick-Change Blow and Vent Plate Assembly" for open-top core boxes. This modern device provides for changing from job to job in a matter of seconds. No longer is it necessary to stop production to change blow head and blow plate, when changing boxes. No longer is it necessary to invest hundreds of dollars in a number of different size blow heads — when simple, inexpensive blow sheets will do the same job.

Foundrymen, both jobbing and production, who realize that the full utilization of modern, automatic machines is the only answer to core production problems, will turn to machines incorporating modern design. These foundrymen, therefore, are invited to investigate the SAN-BLO . . . tomorrow's core blower, ready to do a better job of making cores, today!

The FEDERAL FOUNDRY SUPPLY Company 4600 EAST 71st STREET · CLEVELAND 5, OHIO

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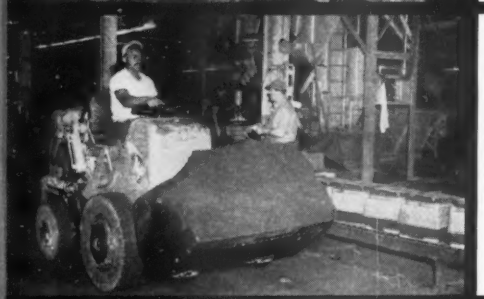
Better Engineered for Unequaled Production

Shortest Turning Radius

The model HA can work where others can't because it has a shorter turning radius than any comparable tractor-shovel — can go through narrow doorways and between spaces less than 4½ feet wide. With a turning radius of only 6 feet 3½ inches it easily turns corners of 6 foot aisles.

Higher Dumping Height

This "PAYLOADER" can deliver its loads over bin or hopper edges up to 6½ feet high. The bucket in maximum dump position can clear heights of 5 feet 2½ inches with a forward reach of more than 2 feet beyond front of machine. Loads can be dumped as fast or slow as desired, and at any height.



Biggest Capacity (18 cu. ft. payload)

With a bucket capacity of 18 cu. ft. payload and 14 cu. ft. struck the model HA has a carrying capacity up to 25% greater than all comparative machines and even more than some bigger, heavier machines. Better engineering including the exclusive 40° bucket tip-back action are the reasons the model HA handles more tons per load and more loads per hour.

Easiest Operating

The entire hydraulic control of the model HA bucket — tip-back, raise, dump, lower — is handled by a single conveniently located lever. It's the simplest, easiest bucket control available. Smooth hydraulic brakes, full anti-friction steering mechanism and torque-converter drive makes the model HA easy to operate at high output rates the full shift.

THE FRANK G. HOUGH CO.
703 Sunnyside Ave., Libertyville, Ill.

Send data on "PAYLOADER" tractor-shovels

- ☐ Model HA (18 cu. ft.) and HAH (1 cu. yd.)
- ☐ Larger models up to 2¼ cu. yd.

Name

Title

Company

Street

City

State

25

Greater productivity on sand handling work is only half the story of the Model HA "PAYLOADER". Its versatility is also valuable to many owners, because quickly-attached floor sweeper, fork-lift, and pusher fork attachments, plus special buckets are available to do many other jobs. You get more value in *any* "PAYLOADER" model because more "PAYLOADER" units are in service than all other wheeled tractor shovels combined, and there's a "PAYLOADER" Distributor ready to serve you right.

SAY "HUFF"

PAYLOADER®

MANUFACTURED BY
THE FRANK G. HOUGH CO. LIBERTYVILLE, ILL.
SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY

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Late News

EXPANSION PLANS: Aluminum Co. of America has selected a rural area of Westmoreland County, Pa., as the future site of a new research and development center. It is located 28 miles east of Pittsburgh near Merwin and is about 8 miles from present research facilities at New Kensington. No immediate construction is planned.

Griffin Wheel Co., subsidiary of American Steel Foundries, Chicago, soon will begin construction of a foundry at Muncie, Kans., near Kansas City, Kans. It will have production capacity of 120,000 steel railroad car wheels a year. The foundry is expected to begin operations in the fall of 1958. Chilled iron wheels will continue to be produced at Griffin's existing foundry at Kansas City.

Electro Refractories & Abrasives Corp., Buffalo, started construction June 15 of a new plant for production of custom refractories for the foundry and other industries.

CHANGES IN BDSA: Business & Defense Services Administration is expected to drop noncompensated industry representatives as heads of its divisions. Such men would serve instead as consultants to government personnel who will head the divisions in the future. The BDSA budget, originally cut by the House from $7,075,000 to $3,515,000, then raised by a joint House-Senate committee to $5,682,000, requires a one-third cut in personnel. It is expected that future BDSA activities will emphasize aid to business rather than defense mobilization.

COMPLETES PLANT: Precision Castparts Corp., Portland, Oreg., has completed its new $125,000 investment casting and shell molding foundry for making aircraft, missile and electronic parts in alloy and stainless steel.

ASTM RECOGNITION: Awards of Merit were made to several men by the American Society for Testing Materials at its annual meeting the week of June 16. Among the recipients were John W. Bolton, retired, director of metallurgical research and testing, Lunkenheimer Co., Cincinnati; Donald L. Colwell, director of laboratories, Apex Smelting Co., Cleveland; Paul V. Faragher, retired, metallurgical division, Aluminum Co. of America, Pittsburgh; and to William A. Kennedy, deceased, supervisor of products, Grinnell Co., Providence, R. I.

MALLEABLE FOUNDERS ELECT: Malleable Founders' Society has elected P. C. DeBruyne, vice president of Moline Malleable Iron Co., St. Charles, Ill., its president for 1957-58. R. W. Crannell, vice president of Lehigh Inc., Easton, Pa., was named vice president, and Roy Willison, controller of National Malleable & Steel Castings Co., Cleveland, was made treasurer. Lowell D. Ryan was re-elected executive vice president and secretary, an office he has held for 9 yr.

At its annual meeting, June 13-14, the society presented the Charles H. McCrea award for unusual contribution to the industry to Wilson H. Moriarty, vice president, National Malleable & Steel Castings Co., Cleveland.

EXPORT SCRAP HEARINGS: The Select Committee on Small Business of the House of Representatives has been holding hearings on the export scrap situation. Executive sessions have been held recently. Donald H. Workman, executive vice president, Gray Iron Founders' Society; Lowell D. Ryan, executive vice president, Malleable Founders' Society, and F. Kermit Donaldson, executive vice president, Steel Founders' Society of America, have presented statements before the committee on behalf of those ferrous foundry organizations.

PRICE CHANGES: Titanium Metals Corp. of America and Du Pont Co. have reduced the price of titanium sponge 50 cents a pound. Grade A-1 sponge now is $2.25 . . . The National Association of Purchasing Agents reports in its June 23 bulletin that a drop in prices of brass ingot, lead and zinc and the increased price of steel scrap are the most significant changes in a rather stable price situation.

PERSONALS: Oscar H. Schildknecht, chairman of the executive committee, Maynard Electric Steel Casting Co., Milwaukee, is retiring July

1 . . . Charles A. Faist has been appointed chief metallurgist, Burnside Steel Foundry Co., Chicago . . . Donald B. Sanberg has joined the executive staff of Malleable Founders' Society . . . Philip B. Craighead, president of Magnesium Products of Milwaukee, Milwaukee, was elected president of the Magnesium Association at its annual meeting June 10-11 . . . Joseph B. Stazinski has been appointed manager-manufacturing for the General Electric Co.'s Elmira Foundries, Elmira, N. Y. Martin J. O'Brien will be manager-manufacturing and E. Raymond Filosi, manager-manufacturing engineering, for GE's Everett-Lynn Foundries at Everett and Lynn, Mass.

NEW FOUNDRY: Chrysler Corp. has started production in a new $400,000 shell molding foundry at its Winfield plant, Detroit. It makes parts for automatic transmissions and gears for fuel pumps and distributors.

FURNACE OUT: Neville Island plant of Pittsburgh Coke & Chemical Co. blew out one of its blast furnaces on June 21 for relining and modernization. It will resume production of merchant pig iron and ferromanganese in about 50 days.

MISCELLANY: Arwood Precision Casting Corp., New York, has purchased Duncan-Rohne & Co., precision casting company in North Hollywood, Calif., and its wholly owned subsidiary, Malco Metal Products Co., at the same location. Both units will be operated as subsidiaries of Arwood . . . Superior Tool & Die Corp., Detroit, has secured control of Bethlehem Foundry & Machine Co., Bethlehem, Pa., with election of six directors to the Bethlehem board . . . New offices of the Non-Ferrous Founders' Society are located in the University Building, 1604 Chicago Ave., Evanston, Ill.; the phone number, DAvis 8-4175 . . . A southern California group has acquired working control and has been elected to the board of directors of Harvill Corp., Los Angeles, producer of die castings. Although four of the six new directors are officers of Interstate Engineering Corp., El Segundo, Calif., that company is in no way involved in the deal . . . American Brake Shoe Co. has moved its New York offices to 530 Fifth Ave., New York 36 . . . The Biennial Middle Atlantic States Apprenticeship & Training Conference will be held in Wheeling, W. Va., July 16-19. Foundry trades will be discussed.

Prices of Foundry Metals and Coke

(As of June 25, 1957)

FOUNDRY COKE

(Per net ton, f.o.b. ovens)

BEEHIVE	
Connellsville	$17.50-18.50
OVEN	
Birmingham	$28.85
Buffalo	30.50
Detroit	30.50
Erie, Pa.	30.50
Indianapolis	29.75
Kearny, N. J.	29.75
Milwaukee	30.50
Montreal, Que.	31.00
Neville Island (Pittsburgh)	29.25
New England, deld.	31.55
Painesville, O.	30.50
Philadelphia	29.50
St. Louis	31.50
St. Paul	29.75
Swedeland, Pa.	29.50
Terre Haute, Ind.	29.75

PIG IRON

(Per gross ton f.o.b. furnace)

	No.2Foundry	Malleable
Birdsboro, Pa.	$67.00	$67.50
Birmingham	59.00	63.00
Buffalo	65.00	65.50
Chicago	65.00	65.00
Cleveland	65.00	65.00
Duluth	65.00	65.00
Erie, Pa.	65.00	65.00
Everett, Mass.	66.50	67.00
Fontana, Calif.	73.00	....
Geneva, Utah	65.00	....
Granite City, Ill.	66.90	67.40
Neville Island (Pittsburgh)	65.00	65.00
Swedeland, Pa.	67.00	67.50
Toledo, O.	65.00	65.00
Troy, N. Y.	67.00	67.50
Youngstown, O.	....	65.00

NONFERROUS INGOT

(Cents per pound, carlots)

BRASS AND BRONZE: Red brass, No. 115, 30.50; tin bronze, No. 225, 40.00; No. 245, 34.50; high-leaded tin bronze, No. 305, 34.50; No. 1 yellow, No. 405, 25.00; manganese bronze, No. 421, 28.00.

ALUMINUM: 99 per cent plus primary ingots 27.10. Secondary No. 12 alloy 20.75-22.00. Deoxidizing grades: No. 1, 22.50, No. 4, 19.00.

MAGNESIUM: 99.8 per cent notched ingots 36.00, f.o.b. Velasco, Tex. (10,000 lb or more).

COPPER: Electrolytic 29.25, delivered Connecticut valley.

ZINC: High grade 11.85 delivered. Die casting alloy No. 3, 15.25; No. 2, 16.25, delivered.

IRON AND STEEL SCRAP

(Consumer prices per gross ton delivered, except as otherwise noted)

	No. 1 Heavy Melting Steel	No. 1 Cupola Cast	Heavy Breakable Cast	Clean Auto Cast	Machinery Cast	Malleable	Short Steel Rails
Birmingham	$48.00-49.00	**$51.00-52.00	.....	.....	.....	.....	$65.00-66.00
Boston*	**43.00-44.00	**34.00-35.00	.....	.....	**42.00-43.00	.....	.....
Buffalo	46.00-47.00	**45.00-46.00	.....	.....	**50.00-51.00	.....	66.00-67.00
Chicago	55.00-56.00	48.00-49.00	.....	52.00-53.00	52.00-53.00	62.00-63.00	75.00-77.00
Cincinnati*	**46.00-47.00	45.00-46.00	42.00-43.00	.....	55.00-56.00	.....	70.00-71.00
Cleveland	51.00-52.00	53.00-54.00	41.00-42.00	54.00-55.00	56.00-57.00	61.00-62.00	73.00-75.00
Detroit*	**45.00-46.00	**46.00	**36.00	**48.00	.....	**52.00	.....
Los Angeles	46.00	**52.00	.....	.....	.....	.....	.....
New York*	53.00-55.00	44.00-45.00	46.00-47.00	.....	.....	.....	.....
Philadelphia	56.00-57.00	46.00	55.00	.....	57.00-58.00	62.00	.....
Pittsburgh	56.00-57.00	46.00-47.00	44.00-45.00	.....	55.00-56.00	.....	71.00-73.00
St. Louis*	45.50	48.00	40.00	48.00	.....	.....	74.00
San Francisco	48.00	53.00	40.00	55.00	53.00	.....	.....
Seattle	45.00	48.00	45.00	.....	.....	.....	.....

*Brokers' buying prices. **F.o.b. shipping point

NOW Castings Are Completely Protected with Whitehead's Joint-Seal

- A ready-to-use plastic compound for perfect sealing
- Saves time, labor, storage space
- Cuts casting cleaning time
- Prevents run-outs and thick fins
- Really seals off core vents
- Gives a complete seal on dry sand molds
- Forms sealing gaskets for pouring basins and runner boxes
- Seals misfit and burned flask joints
- Seals down gate and sprue area on green sand molds
- Eliminates old soaking box; will not freeze
- Insures against leakers on pressure castings
- Balls easily for checking chaplet heights
- Can be applied with our special air gun

Whitehead Brothers COMPANY

Established 1841

NEW YORK OFFICE
324 West 23rd St., New York 11, N. Y.

NEW ENGLAND OFFICE
17 Exchange Place, Providence 1, R. I.

Manufacturers of:

LYQUAGRIP
Ready-to-use core paste

DOB-IT
Ready-to-use core mudding compound

LYQUAFLOUR
For cleaner surface, better shakeout

LYQUAFACE
The liquid sand grain coating

Circle 582 on Inquiry Card—Page 51

One TOOL DOES THE WORK OF Two!

CP Air-Saw CUTS and FILES...

Stainless Steel, Nickel, Copper, Aluminum, Iron, Steel, Brass, Plastics, Plexiglass, Fiberglas, Porcelain, Formica, Corrugated Transite Sheeting, Wood, Plywood, Hard Fibre, Wall Board, Masonite.

Use it as a saw or a file on heavy-duty production line work. Fit it with a blade and it becomes a utility saw capable of cutting practically every material and every possible shape . . . steel blade stock from your all-purpose band saw can be used for special applications. Add a file chuck and use it with round or flat shank files. Conversion takes 60 seconds. Designed with Variable Speed Control, its cutting action can be regulated to suit your work conditions. For details, write *Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, New York.*

Examples of its thousand-and-one uses

1. **In Receiving and Shipping** – opening wooden boxes and crates.
2. **In the Shop** – cutting thin gauge metal without warpage.
3. **In the Foundry** – deburring castings.
4. **In the Automotive field** – installing car heaters, radios and "extra" items.
5. **In the Electrical field** – armature undercutting, cutting coils out of electric motors, filing burrs from stator slots.
6. **In Plant Maintenance** – blind sawing in duct and piping work.

Chicago Pneumatic

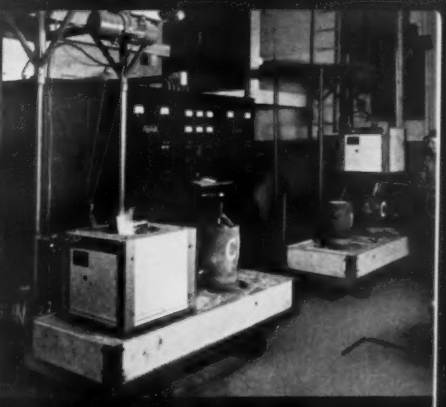
PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

Circle 583 on Inquiry Card—Page 51

Circle 584 on Inquiry Card→

ENGINEERING
Engineering specialists are available to assist with pattern design and development.

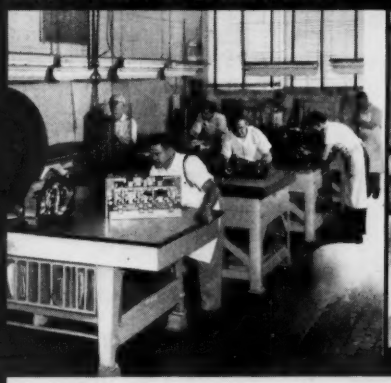
WOOD PATTERN SHOP
Skilled craftsmen, modern woodworking tools combine to produce accurate masters.



FOUNDRY
The latest electric furnaces, controls and methods insure the very finest pattern castings.

A *Complete* SERVICE...

METAL PATTERN SHOP
Experienced metalworking personnel carefully pilot patterns through each operation.



MACHINE SHOP
An efficient machine shop provides complete facilities for all pattern machining needs.

LABORATORY
Laboratory "in process" control and inspection insure consistent quality standards.

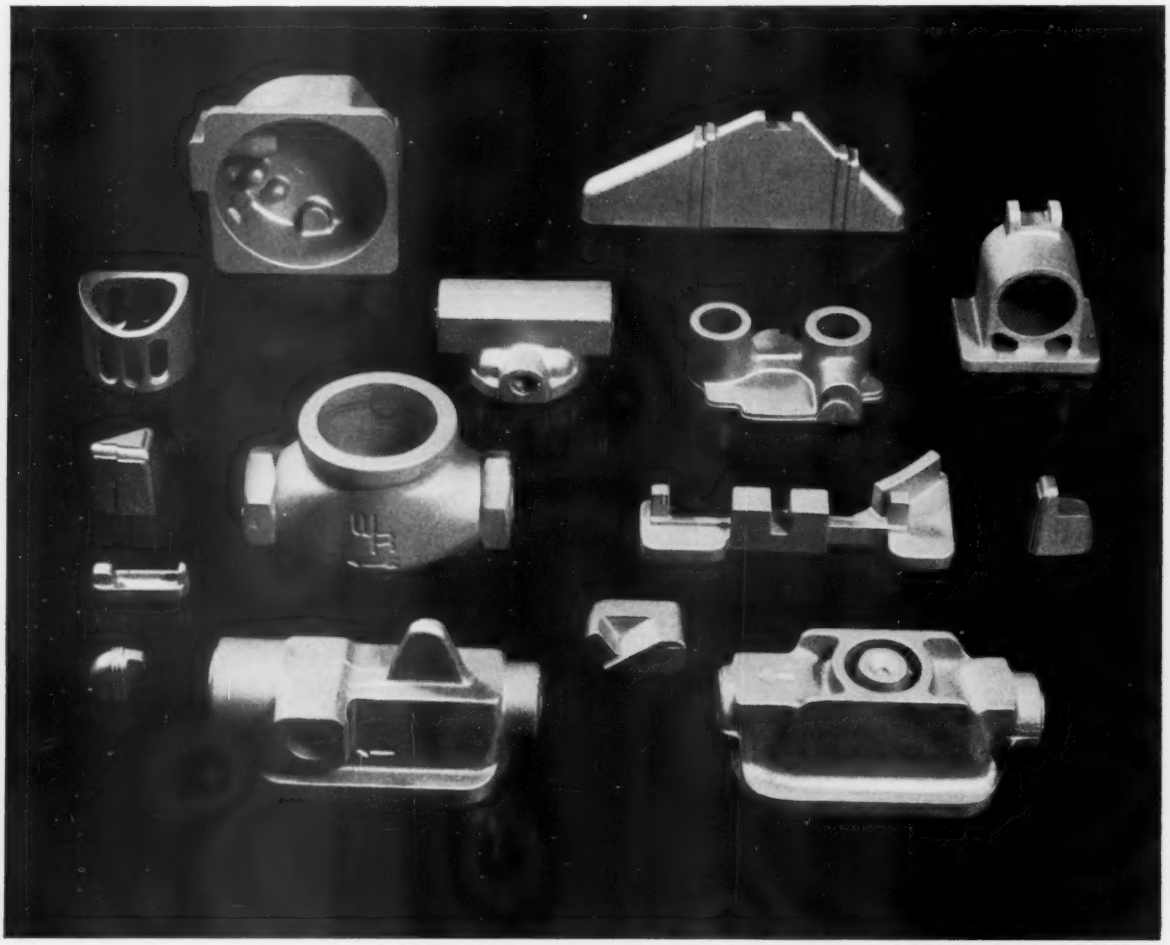
...FROM BLUEPRINT TO PRODUCTION PATTERN

That's right! City Pattern Foundry and Machine Company is equipped with the modern, efficient machinery and staffed with the skilled, experienced personnel to offer you a complete, "start to finish" service on *all* your pattern requirements. Now, obviously, from the standpoint of convenience alone, it pays to have all phases of your pattern development and production under one roof. But convenience, though important, is actually just a "fringe benefit" of City Pattern Foundry and Machine Company service. More important . . . and the reason why so many leading manufacturers rely on our pattern making facilities and knowledge . . . is the fact that our entire operation is geared to combine uncompromising accuracy with maximum efficiency. The result . . . over a period of more than 40 years . . . has been patterns of the finest possible quality at the lowest possible cost.

And that's not all! We're well equipped to serve you in a number of other ways, too. Our foundry department, for example, is one of the most modern and versatile in this section of the country for experimental or production castings, for high conductivity copper, copper alloy, brass and aluminum castings. What's more, City Pattern Foundry and Machine Company offers you complete facilities for fast, accurate, economical machining and fabricating. Want detailed information? Write or call today.

CITY PATTERN
FOUNDRY AND MACHINE CO.

1161 HARPER AVE. • DETROIT 11, MICH.
PHONE: TR 4-2000



Castings produced for White-Rodgers by
Hutchinson Foundry Products Inc.,
Alton, Ill.

For cost cutting castings

Pick a BAKELITE Shell Molding Resin!

TRADE-MARK

The fine details, smooth finish, and close tolerances of the castings above are the result of shell molding with BAKELITE Brand Phenolic Resin BRP-5011.

This resin is one of several produced by Bakelite Company for the shell molding process. Their variety permits you to select the formulation that is best fitted to your own particular requirements.

In addition, you can call on the experience and technical assistance provided by Bakelite Company, pioneer in the manufacture of shell molding resins in this country. For further information on BAKELITE Phenolic Resins for shell molds and cores, write Dept YL-71.

BAKELITE BRAND
PLASTICS

UNION CARBIDE

BAKELITE COMPANY, *Division of Union Carbide Corporation* UCC 30 East 42nd Street, New York 17, N. Y.

The terms BAKELITE, UNION CARBIDE and the Trefoil Symbol are registered trade-marks of UCC.

In Canada: Bakelite Company, Division of Union Carbide Canada Limited, Belleville, Ontario.

Circle 585 on Inquiry Card—Page 51

1 FASTER OPERATING SPEEDS
2 POSITIVE PRODUCT CONTROL
3 FEWER REJECTS
4 LESS UPKEEP

HUTCHINSON SHELL MOLD MACHINE

FAST — Consistently produces molds in 1 minute or less! And it's fully automatic.

RUGGED — Engineered by foundrymen. Tailored for hard usage on a day-in, day-out basis.

ECONOMICAL — A built-in heater in the pattern carrier frame maintains constant heat and simplifies pattern construction . . . at substantially lower cost.

Savings in original cost plus the twin economies of increased production and low maintenance, are the extras you get with the Hutchinson Shell Mold Machine. The ingenious, patented design of this unit permits operating speeds not attainable with any other machine on the market, and it's simplicity keeps downtime at the absolute minimum. Want to know more? Our new bulletin, just released, tells the whole money-saving story. Send for your copy today.

COSTS LESS when you buy it
. . . COSTS LESS to maintain

HUTCHINSON SHELL MOLD CO.
4131 Alby Street • Alton, Illinois

MAIL COUPON TODAY!

HUTCHINSON SHELL MOLD CO., 4131 Alby St., Alton, Ill.
Please rush new brochure on Hutchinson Shell Mold Machine

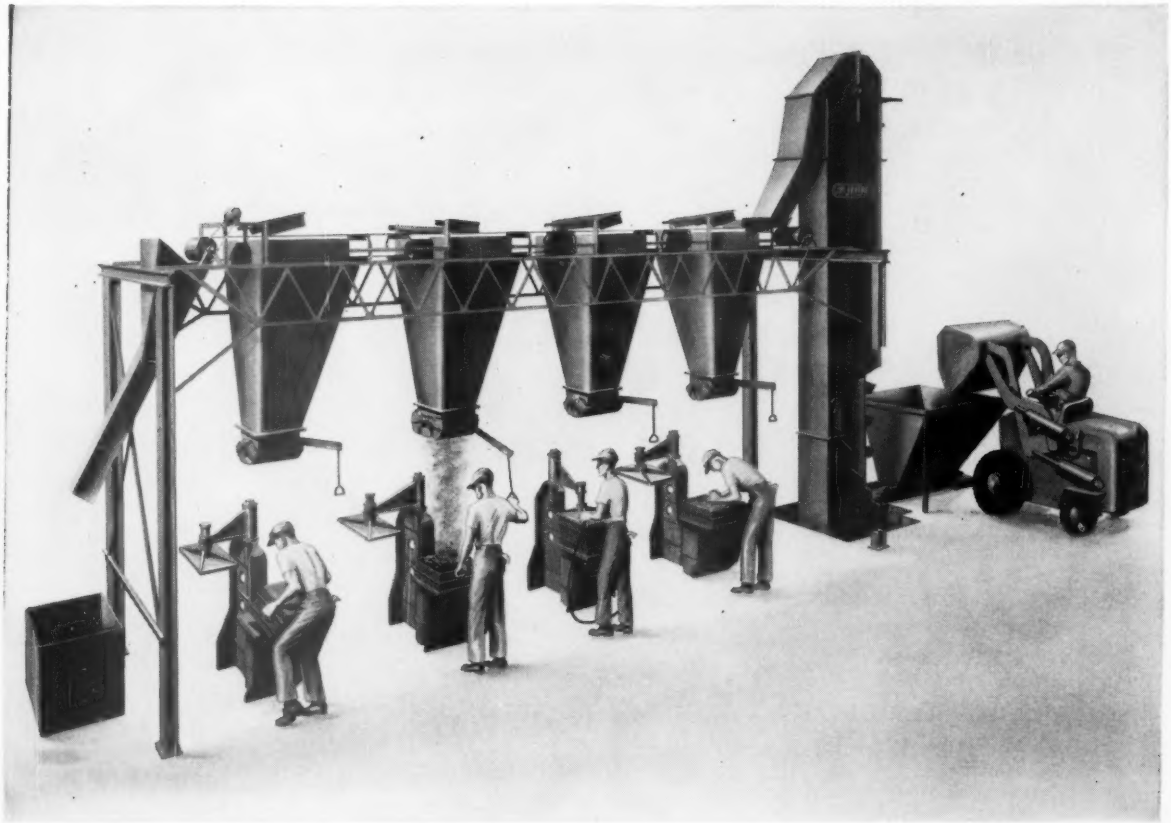
Name_____

Company_____

Address_____

City_____ State_____

Circle 586 on Inquiry Card—Page 51



Small foundries gain big foundry advantages with the **JEFFREY** Overhead Sand System

Available for 2, 4, 6 and 8 or more stations

EVEN with as few as two molding stations, you can economically install this Jeffrey overhead sand system. Molders' time is saved, their work made easier. No more having to lift the sand from the floor, because sand flows directly from overhead hoppers into the flasks.

Your molding costs are reduced, production is speeded up, workers are happier.

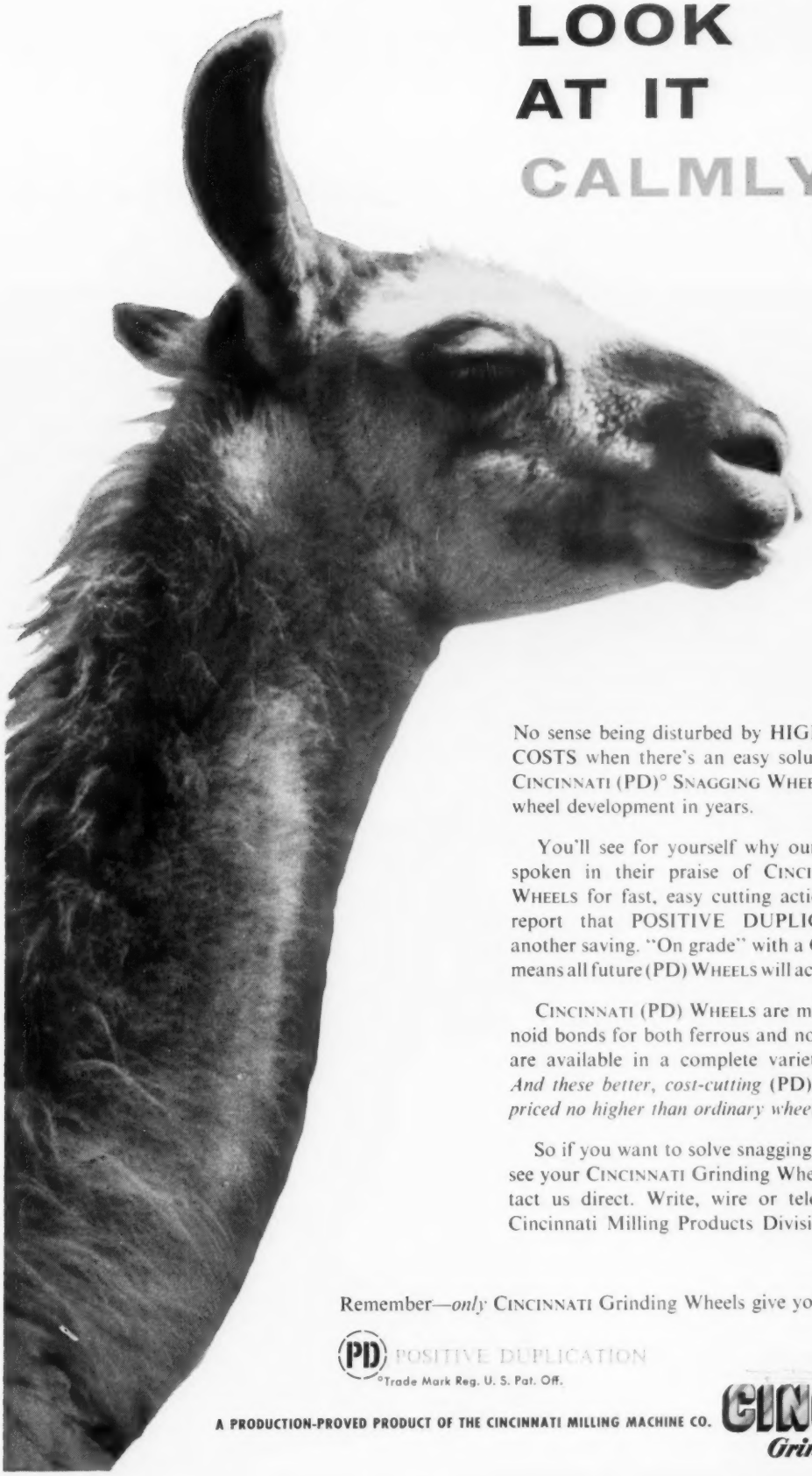
These Jeffrey overhead sand units were designed to meet the small foundry's need for low-cost equipment that gives it big-foundry advantages. Built as package units, savings made through reduced engineering and manufacturing costs are passed along to you. For detailed information, get in touch with The Jeffrey Manufacturing Company, 907 North Fourth Street, Columbus 16, Ohio.

HERE'S HOW IT WORKS

An LMV vibrating conveyor delivers conditioned sand from the hopper to the bucket elevator. It discharges sand directly into the hopper of a 2-station unit—onto the belt conveyor of larger units—from which plows divert it into the hoppers. Thus sand is always available on the molding line.

CONVEYING • PROCESSING • MINING EQUIPMENT . . . TRANSMISSION MACHINERY . . . CONTRACT MANUFACTURING

JEFFREY



LOOK AT IT CALMLY

No sense being disturbed by HIGH CLEANING ROOM COSTS when there's an easy solution in sight. Switch to CINCINNATI (PD)° SNAGGING WHEELS, the greatest grinding wheel development in years.

You'll see for yourself why our customers are so outspoken in their praise of CINCINNATI (PD) SNAGGING WHEELS for fast, easy cutting action. Our customers also report that POSITIVE DUPLICATION (PD) means another saving. "On grade" with a CINCINNATI (PD) WHEEL means all future (PD) WHEELS will act and grind exactly alike.

CINCINNATI (PD) WHEELS are made in vitrified and resinoid bonds for both ferrous and non-ferrous foundries and are available in a complete variety of sizes and shapes. *And these better, cost-cutting* (PD) SNAGGING WHEELS *are priced no higher than ordinary wheels.*

So if you want to solve snagging wheel problems calmly, see your CINCINNATI Grinding Wheels Distributor. Or contact us direct. Write, wire or telephone Sales Manager, Cincinnati Milling Products Division, Cincinnati 9, Ohio.

Remember—*only* CINCINNATI Grinding Wheels give you

(PD) POSITIVE DUPLICATION

°Trade Mark Reg. U. S. Pat. Off.

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

CINCINNATI° Grinding Wheels

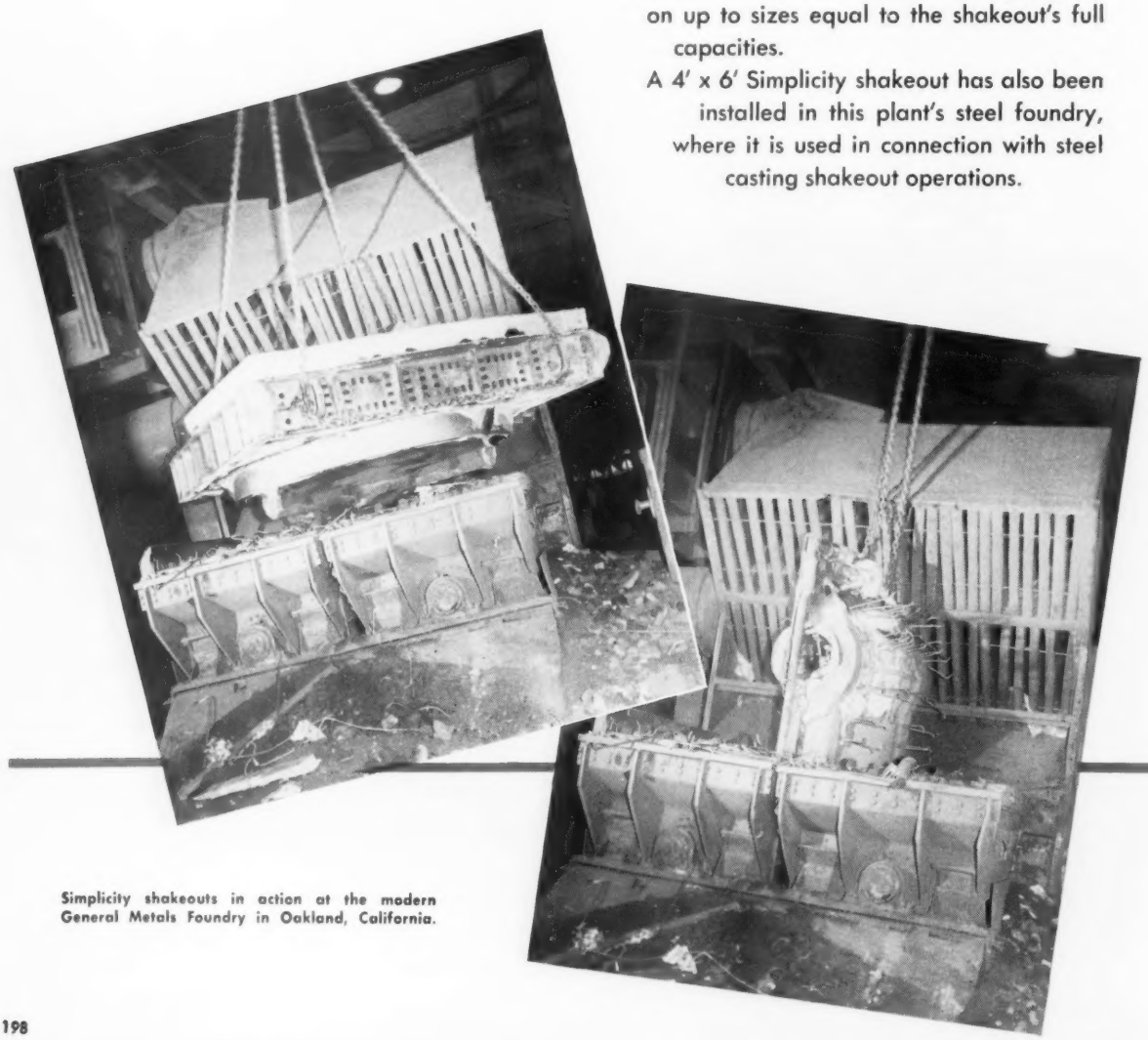
HERE'S HOW SIMPLICITY

boosting production at GENERAL METAL'S

Simplicity Engineering is proud that Simplicity machines are a part of General Metals' new $5 million plant. Both the iron and the steel foundries are using 8′ x 10′ Simplicity shakeouts, these units embodying dual Model DE 8′ x 5′s.

The size of castings put through the big shakeouts at General Metals range from 100 pounds on up to sizes equal to the shakeout's full capacities.

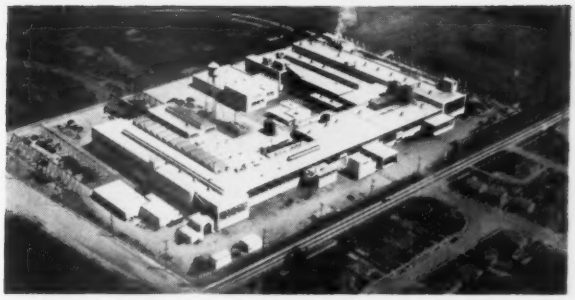
A 4′ x 6′ Simplicity shakeout has also been installed in this plant's steel foundry, where it is used in connection with steel casting shakeout operations.



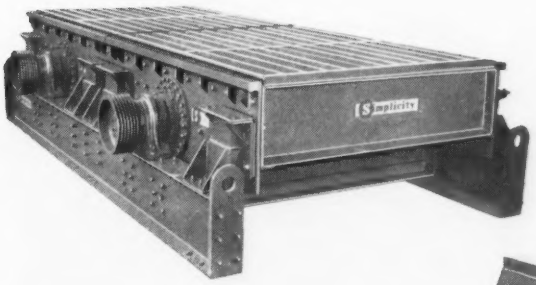
Simplicity shakeouts in action at the modern General Metals Foundry in Oakland, California.

198

SHAKEOUTS are new foundry

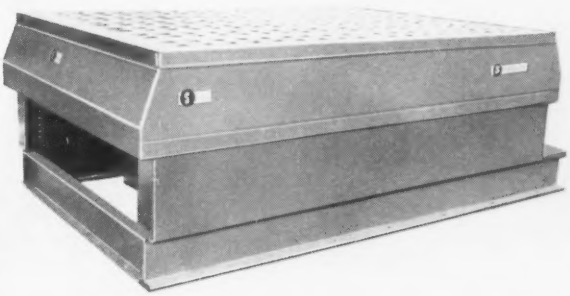


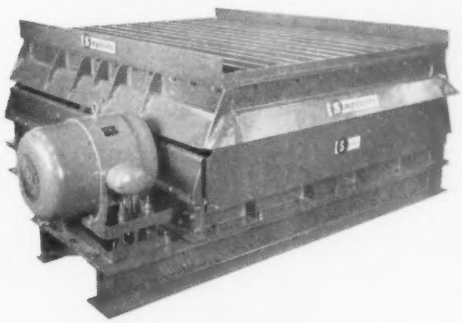
THERE IS A SIMPLICITY SHAKEOUT UNIT TO FIT YOUR PRODUCTION REQUIREMENTS:



Simplicity shakeouts are available with three different assemblies, in many models and sizes. • The Gyrating shakeouts, as installed at General Metals, are the most versatile and widely accepted units of their type in the foundry industry. • The two bearing Simpli-Flo models have a "true circle" action similar to the Gyrating models, but eliminate the two main frame bearings—important where installation space is at a premium. • The double shaft, spring mounted OS-A-VEYOR shakeouts are excellent for the big jobs—the largest units capable of handling up to 200 tons.

Simplicity Gyrating Shakeouts, like this 5' x 13' dual, are standard equipment in foundries throughout the United States and Canada. Sizes from 2' x 3' x 12' x 16' are available.





The OS-A-VEYOR's VERTICAL ACTION produces fast shakeout without travel of castings or flasks off of the machine deck. This 7' x 8' Model OMA is an example of such a unit. Adjustment can be made for extremely high speed travel, where desired.

THE SIMPLI-FLO ACTION is highly effective and, at the same time, travels the castings and flask toward one end of the shakeout. For lighter jobbing work or production, this unit is especially recommended. The machine shown here, is an example of a shakeout, which embodies this type of action.

Write today for SIMPLICITY ENGINEERING catalog #F-7 "SIMPLICITY FOUNDRY EQUIPMENT" which describes these and many other SIMPLICITY machines which will help you speed your founding operations.

SALES REPRESENTATIVES IN ALL PARTS OF THE U.S.A.

FOR CANADA: Simplicity Materials Handling Limited, Guelph, Ontario.

FOR EXPORT: Brown and Sites, 50 Church St., New York 7, N. Y.

Simplicity
TRADE MARK REGISTERED

ENGINEERING COMPANY • DURAND 7, MICHIGAN

Circle 589 on Inquiry Card—Page 51

Your VCA Representative is a Good Man to Know!

Irons for cylinder blocks? Add Vancoram V-5 Foundry Alloy at the ladle. Irons for brake drums? Graphidox No. 4 is the perfect graphitizing inoculant. Irons for cam shafts? Noduloy Alloys provide a really effective nodularizing inoculant.

Look over this list of Vancoram Products for the iron foundry – you'll find the exact alloy you need. And get to know your Vancoram representative better. He can help you improve your irons – and your end products.

VANCORAM PRODUCTS FOR THE IRON FOUNDRY

Chromium
Ferrochromium Briquettes
High Carbon Ferrochromium
Low Carbon Ferrochromium
Exlo®
Ferrochrome-silicon Alloys

Manganese
Ferromanganese Briquettes
Silicomanganese Briquettes
Silicomanganese Alloys

Ferrovanadium
All Grades

Silicon
Ferrosilicon Briquettes
Ferrosilicon (all grades including Low Aluminum and Boron)
Inoculoy® (85% Fe Si—.50% min. Calcium)

Special Foundry Alloys
Graphidox No. 4
Noduloy® Alloys
V-5 Foundry Alloys
Ferroboron
Grainal Alloys

Vancoram Products for the Iron Foundry are also distributed by:
Steel Sales Corporation
J. M. Tull Metal & Supply Co.
Whitehead Metal Products Company, Inc.
Williams & Company, Inc.

VANCORAM

VANADIUM CORPORATION OF AMERICA

420 Lexington Avenue, New York 17, N. Y. • Chicago • Cleveland • Detroit • Pittsburgh

Producers of alloys, metals and chemicals

Circle 590 on Inquiry Card—Page 51

Heavy material causing high maintenance?
Read how Pacific Northwest Alloys

Loading an alloy which averages 8,500 lbs/yd, cut repair costs 80%

THE BACKGROUND

Pacific Northwest Alloys, Inc., is a wholly-owned subsidiary of Chromium Mining & Smelting Corporation of Chicago. Their plant, located just outside Spokane, Washington, produces an alloy known as low carbon ferro chrome from African, Philippine and domestic chrome ores. This new fast-melting alloy is used in production of some of the new low-carbon stainless steels.

THE PROBLEM

Low carbon ferro chrome is *heavy*. An 8-inch chunk of it weighs nearly 100 lbs. Tractor shovels load this dense alloy by impact loading. Other tractor loaders pounded themselves to pieces moving the jagged, interlocking lumps. Maintenance costs grew so high, in fact, management insisted new machines be tried. Crawlers were considered, but proved too slow. Then, company officials heard about Michigan Tractor Shovels, obtained an in-plant demonstration.

THE SOLUTION

Four 16 cubic ft Michigan Model 12B Tractor Shovels now handle the work of *five* 14 cu ft old-style tractor loaders—and do it *better*, at far lower maintenance cost! Jim McBride, Mechanical Foreman, says "These little jewels have sure done a job for us! And maintenance has been only ⅕ that of the old equipment!" George Fegan, Quality Control Manager, especially commends the Power-Shift Transmission and shock-absorbing Torque Converter. Best of all, the two Michigan Model 12B's—working under continuously brutal shock conditions—load millions of pounds of this heavy hard-to-handle alloy without trouble, month after month.

THE MORAL

Their high output leads to one conclusion . . . if Michigans can "take it", week in and week out, on this *extremely tough* job, they'll probably do well on your work too. See for yourself. Call your Michigan Distributor; he'll be glad to arrange a demonstration. *You name the job!*

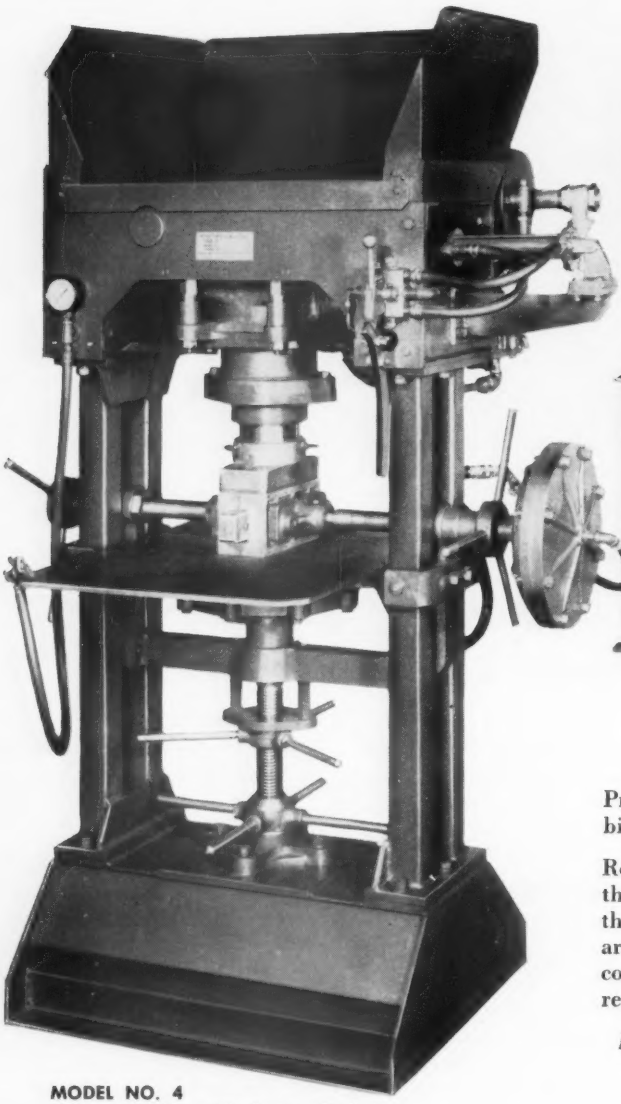
Michigan is a registered trade-mark of

CLARK EQUIPMENT COMPANY
Construction Machinery Division
2475 Pipestone Road
Benton Harbor 22, Michigan
In Canada: Canadian Clark, Ltd., St. Thomas, Ontario

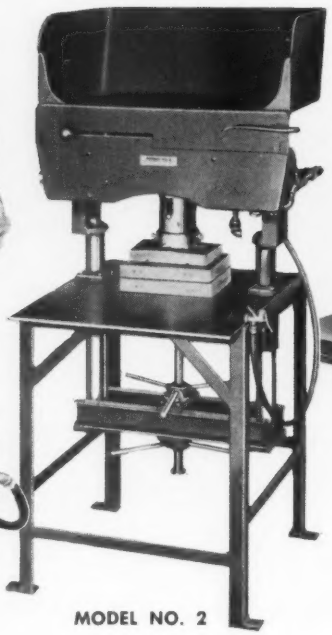
CLARK® EQUIPMENT

Circle 591 on Inquiry Card—Page 51

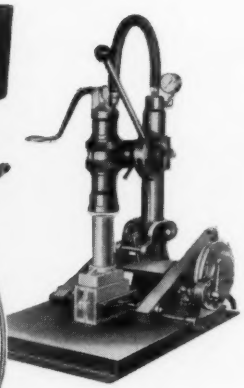
Redford CORE BLOWERS



MODEL NO. 4
(Also available with draw cylinder)



MODEL NO. 2



BENCH TYPE

Proven performance — simplicity — flexibility — power — speed.

Redfords are keeping pace with progress in the foundry. From the first bench type to the new No. 4 . . . all Redford Core Blowers are designed to meet your demand for better cores at lower cost, regardless of production requirements.

For complete information, write for our detailed literature.

Redford IRON & EQUIPMENT CO.

20733 GLENDALE AVENUE • DETROIT 23, MICHIGAN • PHONE: KENWOOD 1-8611

When you melt...

Lectromelt*

*REG. T. M. U. S. PAT. OFF.

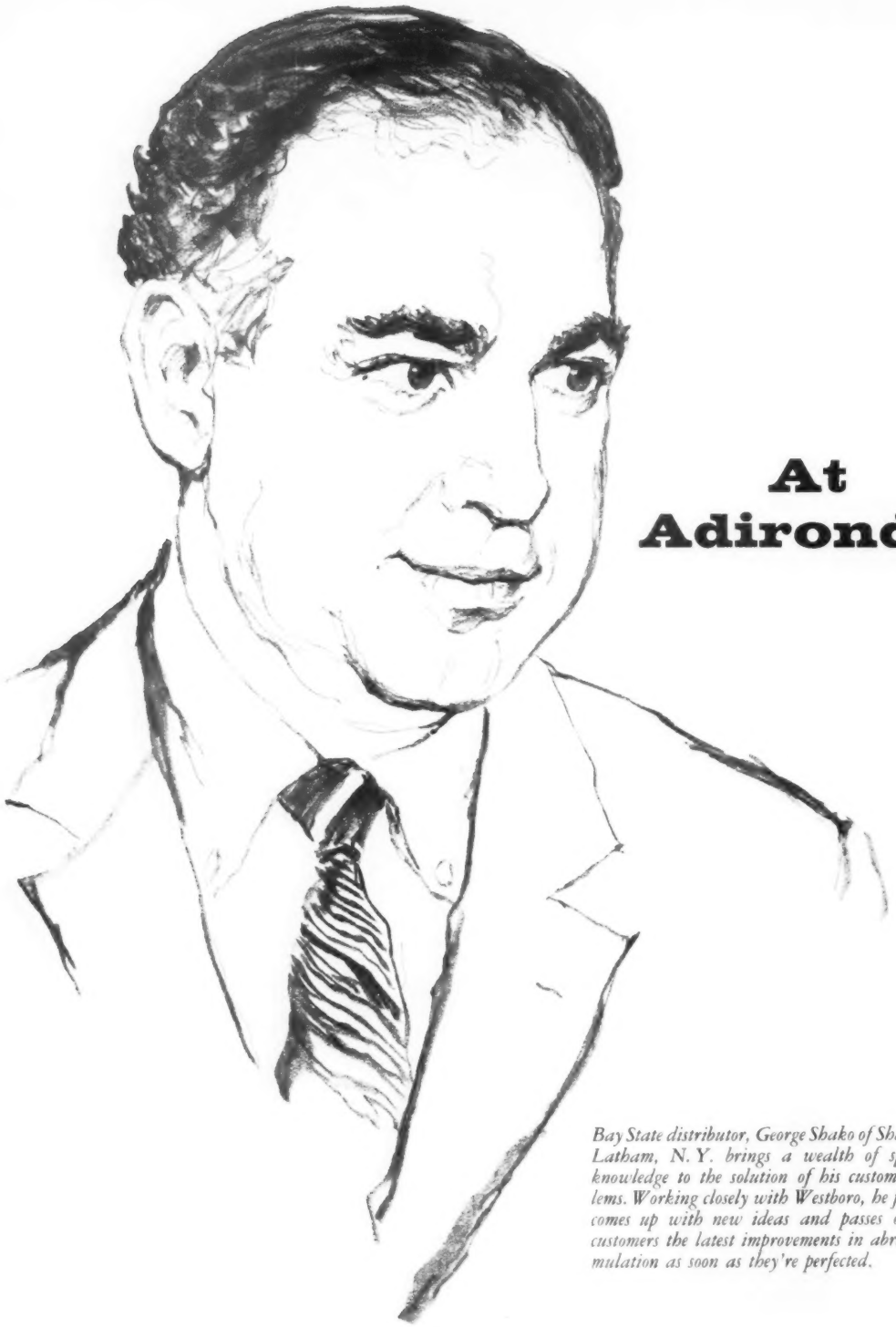
In the United States

Lectromelt Furnace Division, McGraw-Edison Company
314 32nd Street, Pittsburgh 30, Pennsylvania.

and around the World

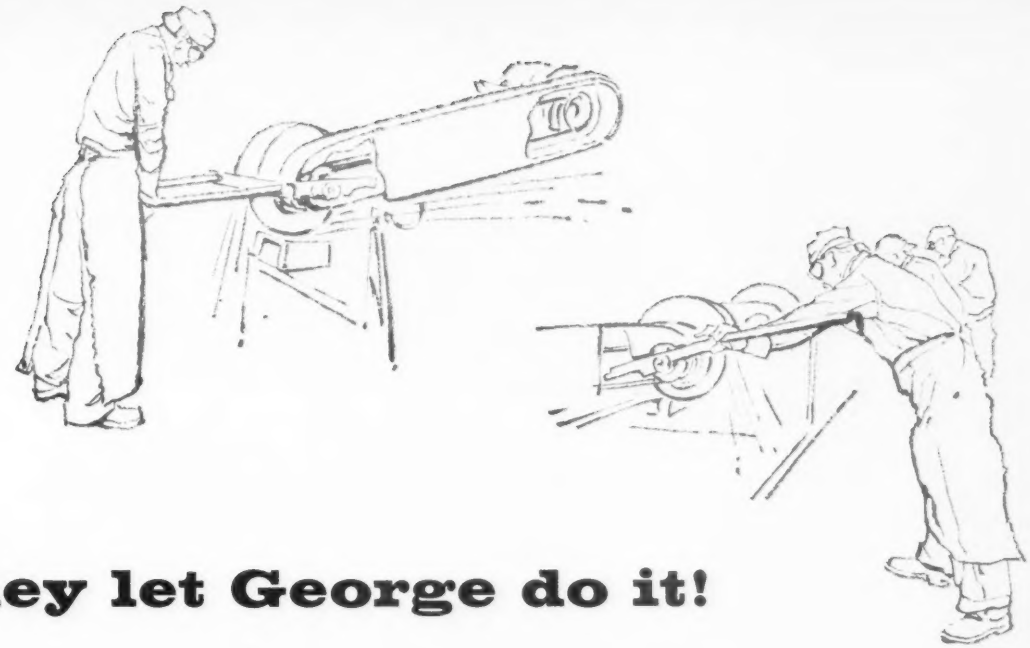
Forni Stein—*Genova, Italy*
Daido Steel Company, Ltd.—*Nagoya, Japan*
Electric Furnace Company, Ltd.—*Weybridge, England*
Demag-Elektrometallurgie, GmbH—*Duisburg, Germany*
General Electrica Espanola—*Bilbao, Spain*
Stein et Roubaix—*Paris, France*
S. A. Stein & Roubaix—*Bressoux-Liege, Belgium*

Catalog 9-B describes efficient, time-proven Lectromelt furnaces and equipment.



At Adirondack...

Bay State distributor, George Shako of Shako, Inc., Latham, N. Y. brings a wealth of specialized knowledge to the solution of his customers' problems. Working closely with Westboro, he frequently comes up with new ideas and passes on to his customers the latest improvements in abrasive formulation as soon as they're perfected.



...they let George do it!

"Let George do it" is sound executive technique... when you have the right George. And nobody knows that better than Frank J. Martin, purchasing agent for Adirondack Foundries of Watervliet, N.Y. With a solid 29 years of foundry experience, Frank Martin knows his costs and materials inside out. Even more important, he knows *men*.

To sell Adirondack, Bay State distributor George Shako had to prove that he could solve the problems involved in cleaning and finishing steel castings that weighed from one ounce to ten tons . . . and varied from hydraulic valve bodies and paper-mill rolls to railroad truck frames and artillery parts.

Then he had to show that he could supply the right wheels at the right time for a collection of big swing-frame grinders, pedestal grinders and light portables that gobbled up wheels like a pack of hungry hound dogs.

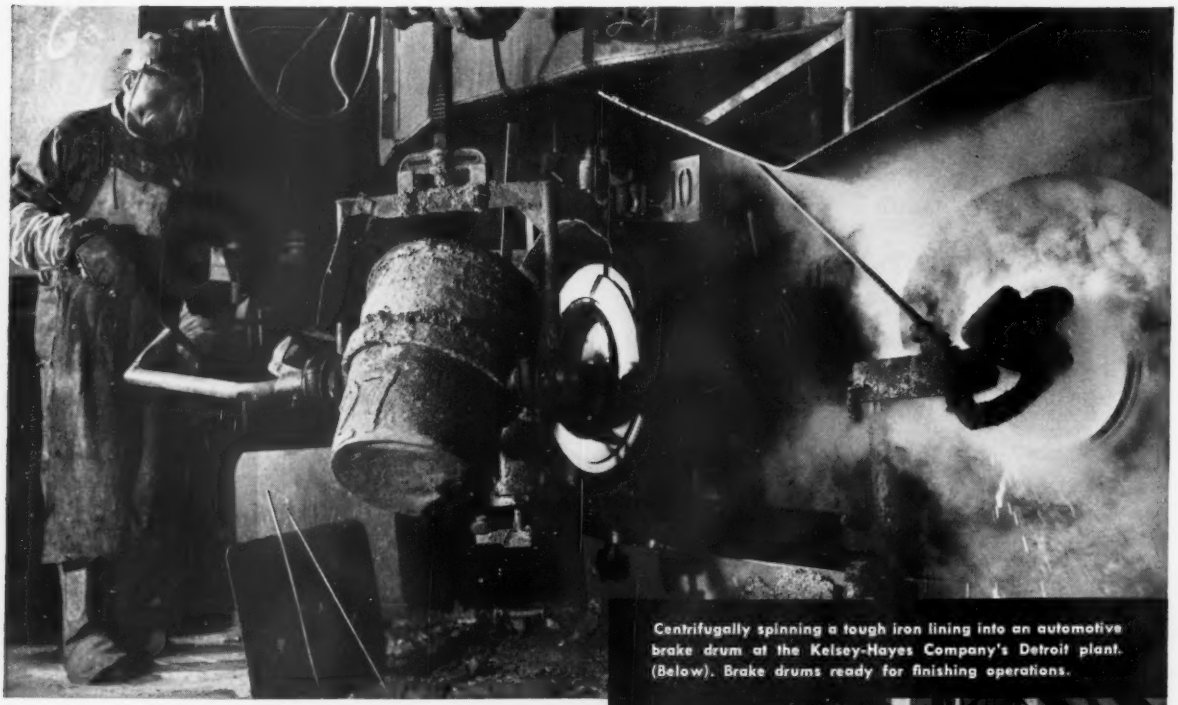
He did both so successfully that Bay State is now a regular Adirondack supplier.

Whatever your company's abrasive problems may be, you'll find Bay State representatives ready to help and competent to work out practical solutions.

BAY STATE
WHEELS of PROGRESS

BAY STATE ABRASIVES

Bay State Abrasive Products Co., Westboro, Massachusetts.
Branch Offices and Warehouses: Bristol, Conn., Chicago, Cleveland, Detroit, Pittsburgh.
Distributors: All principal cities. Bay State Abrasive Products Co. (Canada) Ltd., Brantford, Ontario.



Centrifugally spinning a tough iron lining into an automotive brake drum at the Kelsey-Hayes Company's Detroit plant. (Below). Brake drums ready for finishing operations.

Kelsey-Hayes casts longer wearing brake drums with Hanna pig iron

Kelsey-Hayes is a key supplier to the auto industry. One of its leading products is a brake drum with a centrifugally spun iron lining. Kelsey-Hayes also produces thousands of sand cast brake drums. Strict uniformity of each melt is of major importance to Kelsey-Hayes.

To maintain their high standards, Kelsey-Hayes uses thousands of tons of Hanna Malleable Pig Iron annually.

Kelsey-Hayes, like the many other Hanna customers, knows that for pig iron of high metallurgical quality and analysis, it can always depend on Hanna.

Hanna makes all regular grades of pig iron, as well as HannaTite and Hanna Silvery, available in two sizes—the 38-pound pig and the 10-pound HannaTen ingot. Hanna qualities contribute to the production of denser, stronger castings with uniform machining qualities. These features are particularly beneficial in HannaTite—a specially made iron, possessing extra-fine grain structure with smaller, uniformly distributed graphite flakes.

HANNA
THE FIRST KNOWN NAME IN IRON

THE HANNA FURNACE CORPORATION
Buffalo • Detroit • New York • Philadelphia
Merchant Pig Iron Division of
NATIONAL STEEL CORPORATION

Reader Information Service

FOUNDRY

Use these cards for more information on anything advertised in this issue, or for extra copies of editorial articles. Don't overlook additional cards on page 196 for more information on items described in the Foundry Equipment and Supplies Digest section in this issue.

FURTHER INFORMATION on Advertised Products ?

July 1957

SIMPLY CIRCLE AD ITEM NUMBER BELOW

521	536	551	566	581	596	611	626
522	537	552	567	582	597	612	627
523	538	553	568	583	598	613	628
524	539	554	569	584	599	614	629
525	540	555	570	585	600	615	630
526	541	556	571	586	601	616	631
527	542	557	572	587	602	617	632
528	543	558	573	588	603	618	633
529	544	559	574	589	604	619	634
530	545	560	575	590	605	620	635
531	546	561	576	591	606	621	636
532	547	562	577	592	607	622	637
533	548	563	578	593	608	623	638
534	549	564	579	594	609	624	639
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642	657	672	687	702	717	732	747
643	658	673	688	703	718	733	748
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653	668	683	698	713	728	743	758
654	669	684	699	714	729	744	759
655	670	685	700	715	730	745	760
761	776	791	806	821	836	851	866
762	777	792	807	822	837	852	867
763	778	793	808	823	838	853	868
764	779	794	809	824	839	854	869
765	780	795	810	825	840	855	870
766	781	796	811	826	841	856	871
767	782	797	812	827	842	857	872
768	783	798	813	828	843	858	873
769	784	799	814	829	844	859	874
770	785	800	815	830	845	860	875
771	786	801	816	831	846	861	876
772	787	802	817	832	847	862	877
773	788	803	818	833	848	863	878
774	789	804	819	834	849	864	879
775	790	805	820	835	850	865	880

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NAME .....

POSITION .....

FIRM .....

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CITY ..... ZONE.....

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FURTHER INFORMATION on Advertised Products ?

July 1957

SIMPLY CIRCLE AD ITEM NUMBER BELOW

521	536	551	566	581	596	611	626
522	537	552	567	582	597	612	627
523	538	553	568	583	598	613	628
524	539	554	569	584	599	614	629
525	540	555	570	585	600	615	630
526	541	556	571	586	601	616	631
527	542	557	572	587	602	617	632
528	543	558	573	588	603	618	633
529	544	559	574	589	604	619	634
530	545	560	575	590	605	620	635
531	546	561	576	591	606	621	636
532	547	562	577	592	607	622	637
533	548	563	578	593	608	623	638
534	549	564	579	594	609	624	639
535	550	565	580	595	610	625	640
641	656	671	686	701	716	731	746
642	657	672	687	702	717	732	747
643	658	673	688	703	718	733	748
644	659	674	689	704	719	734	749
645	660	675	690	705	720	735	750
646	661	676	691	706	721	736	751
647	662	677	692	707	722	737	752
648	663	678	693	708	723	738	753
649	664	679	694	709	724	739	754
650	665	680	695	710	725	740	755
651	666	681	696	711	726	741	756
652	667	682	697	712	727	742	757
653	668	683	698	713	728	743	758
654	669	684	699	714	729	744	759
655	670	685	700	715	730	745	760
761	776	791	806	821	836	851	866
762	777	792	807	822	837	852	867
763	778	793	808	823	838	853	868
764	779	794	809	824	839	854	869
765	780	795	810	825	840	855	870
766	781	796	811	826	841	856	871
767	782	797	812	827	842	857	872
768	783	798	813	828	843	858	873
769	784	799	814	829	844	859	874
770	785	800	815	830	845	860	875
771	786	801	816	831	846	861	876
772	787	802	817	832	847	862	877
773	788	803	818	833	848	863	878
774	789	804	819	834	849	864	879
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CITY ..... ZONE.....

STATE .....

PRODUCT MANUFACTURED .....

FOUNDRY Reader Information Service

Use these cards for more information on anything advertised in this issue, or for extra copies of editorial articles. Don't overlook additional cards on page 196 for more information on items described in the Foundry Equipment and Supplies Digest section in this issue.

FIRST CLASS
Permit No. 36
CLEVELAND, OHIO

BUSINESS REPLY CARD
No Postage Stamp Necessary if Mailed in the United States

—4c POSTAGE WILL BE PAID BY—

FOUNDRY
Penton Building
Cleveland 13, Ohio

Reader's Service Dept.

FIRST CLASS
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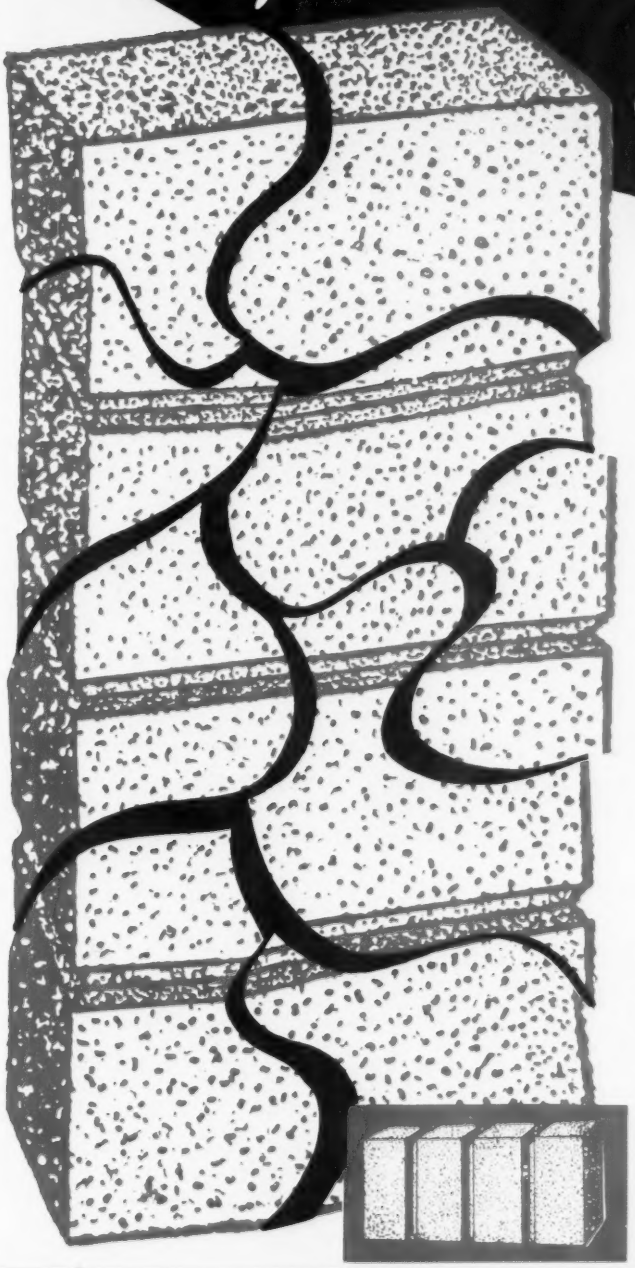
Put this together and get a picture of

BETTER, CLEANER CASTINGS



Use *Famous*

CORNELL

CUPOLA FLUX

Purges Molten Iron of Impurities

★ ★ ★ ★ ★ ★

Why it pays to use Famous CORNELL Aluminum and Brass Flux

- Makes metal pure and clean.
- Permits use of more scrap without danger of dirt, porous places or spongy spots, due to dirty metal.
- Thinner, yet stronger sections can be poured.
- Metal does not cling to the dross as readily.
- Crucible or furnace linings are kept clean and preserved.
- Cleanses molten brass (whether red or yellow) even when the dirtiest brass turnings are used.
- Saves considerable tin and other metals.
- Forms a perfect covering over the metal during melting, prevents oxidation and reduces obnoxious gases to a great extent.

Write for Bulletin 46-A

Often Imitated ... Never Equalled!

The CLEVELAND FLUX Company

1026-40 MAIN AVENUE, N. W. • CLEVELAND 13, OHIO

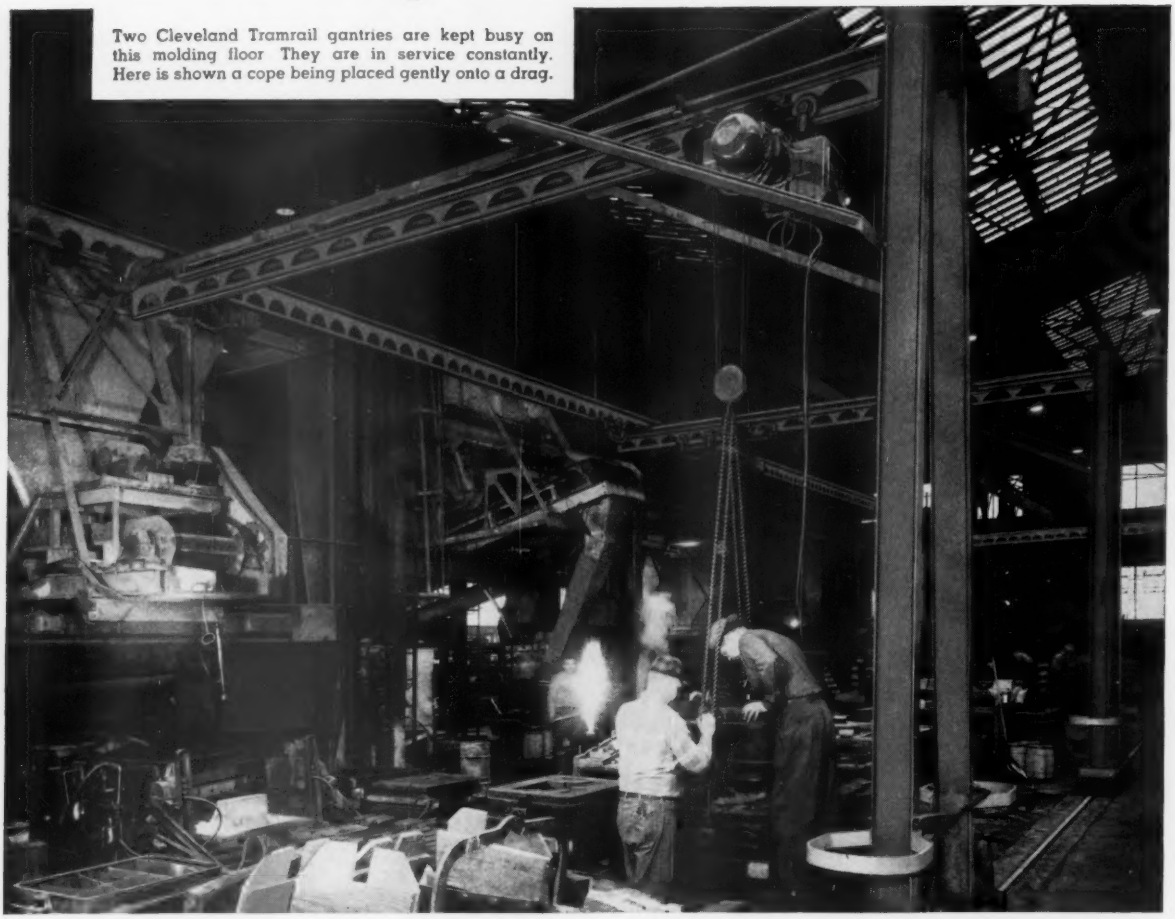
Manufacturers of Iron, Semi-Steel, Malleable, Brass, Bronze, Aluminum and Ladle Fluxes—Since 1918

FAMOUS CORNELL FLUXES

Trade Mark Registered

Gantries Expedite Production

For Largest Western Foundry



Two Cleveland Tramrail gantries are kept busy on this molding floor They are in service constantly. Here is shown a cope being placed gently onto a drag.

FOR many years Cleveland Tramrail gantry cranes have been used for various foundry handling operations at the Pacific Car & Foundry Company, Renton, Washington, whose foundry is reputed to be the largest west of the Mississippi River.

The cranes have proven a tremendous aid in obtaining maximum production and easing the work by eliminating much of the former heavy manual lifting and moving of materials. Because their design permits their operation under heavy overhead traveling cranes, the gantries can be placed wherever lifting and handling service is needed to take care of local work areas.

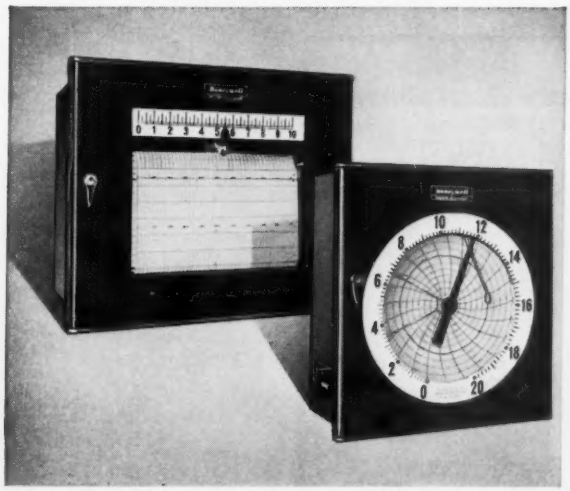
Gantry cranes are one of many types of Cleveland Tramrail equipment which offer opportunities for foundries to expedite production and make substantial savings.

GET THIS BOOK!

BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
3838 EAST 286TH ST. WICKLIFFE, OHIO

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

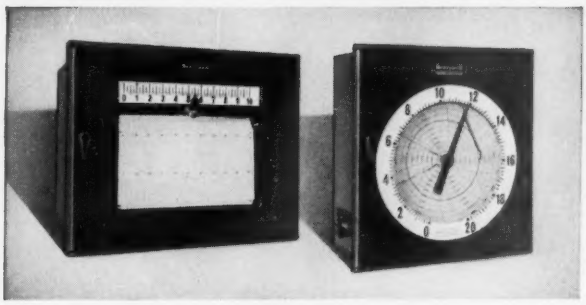


Precision Class 15 Line of *ElectroniK* instruments. Calibrated accuracy, ± .25% of span. Complete selection of many types of indicating and recording models, including electric and pneumatic controllers of most advanced type, and multipoint monitoring or recording of 2 to 400 points.

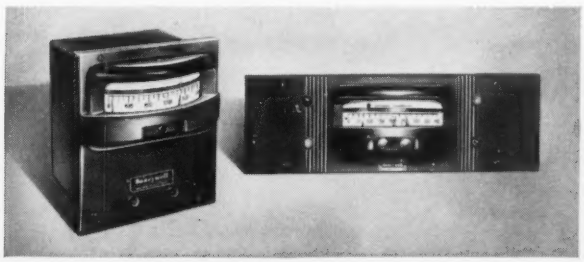
for accuracy, versatility, price

. . . Let your application decide which Honeywell instrument

fits your needs



Special Class 14 Line of *ElectroniK* instruments. Calibrated accuracy, ± .5% of span. Priced lower than the Precision line. Strip chart and circular chart instruments, circular scale indicating controllers. With various types of electric control.



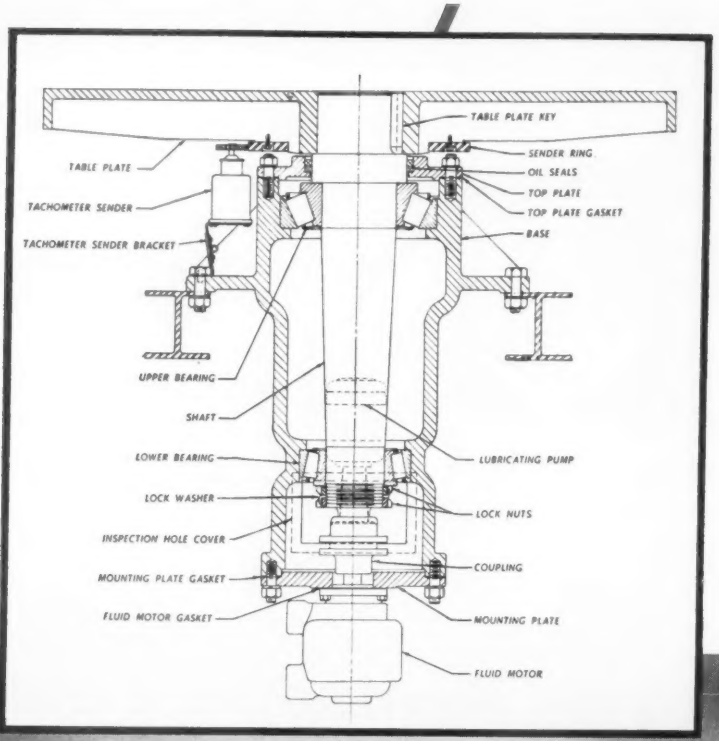
Millivoltmeter Instruments. Dependable, accurate service at low cost. Plug-in unit design speeds servicing. *Pyr-O-Vane* controllers, in either horizontal or vertical case, offer snap-action or time-proportioning electric control.

No need to "shop around" for instrumentation to fit your temperature measurement or control problem. From the Honeywell line—the most complete and diversified in the industry—you can be sure of getting exactly what your application requires.

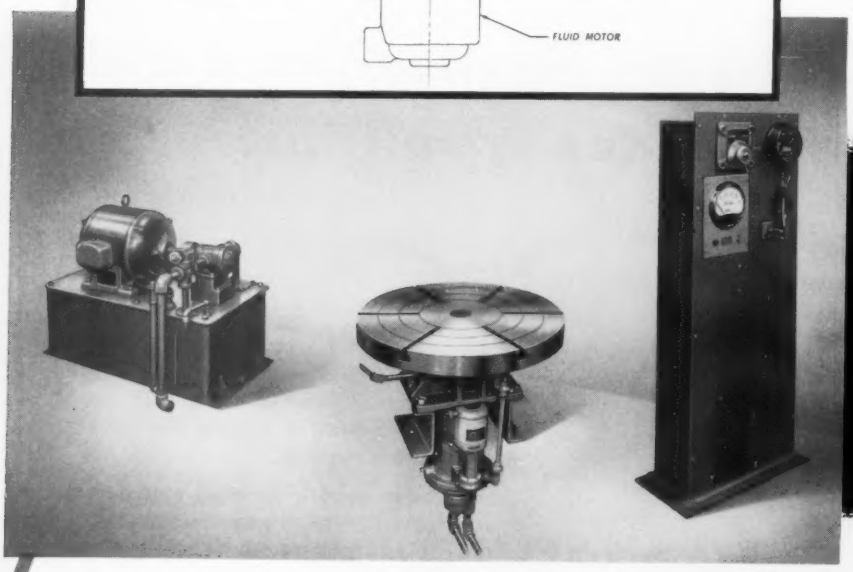
Your local Honeywell engineer will be glad to consult on your requirements. Call him today . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Avenues, Philadelphia 44, Pa.—in Canada, Toronto 17, Ontario.

MINNEAPOLIS
Honeywell
BROWN INSTRUMENTS
First in Controls



Sixth of a series . . .



Fully Patented

Here hydro-

why foundrymen buy a H

THE Herman Hydro-Centrifugal Casting Machine, because of its hydraulic powering, has a high degree of versatility to meet a variety of operating conditions.

There are an even dozen reasons why it should be seriously considered, if you are looking for modern casting production by the centrifugal method.

Here are the reasons:

1 Machines controlled and operated entirely by hydraulic power.

2 Smooth stepless variance of table speeds from minimum to maximum.

3 Single control for starting, braking stopping, and reversing.

4 Tachometer indicates actual r.p.m. of table plate.

5 Variable acceleration and deceleration of rotative speeds to most efficiently suit requirements.

6 Table Spindle connected directly to fluid motor.

7 Only one power unit necessary to operate several machines.

8 Mechanically lubricated; no manual oiling required.

9 Power unit remotely installed insuring protection from operation hazards.

10 Flow and volume of oil automatically controlled providing overload protection.

11 Instantaneous setting of rotative speed by dial control on flow valve.

12 All wearing parts completely enclosed providing protection from foreign matter.

This Hydro-Centrifugal Casting Machine is another in the complete Herman line . . . . . a type and size for all foundry operations.

is the HERMAN vertical centrifugal casting machine

Further information will be gladly supplied. Catalog on request.

HERMAN molding machine

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

HERMAN

Best Known Name in Molding Machines

HERMAN PNEUMATIC MACHINE CO. UNION BANK BUILDING, PITTSBURGH 22, PA.

Each batch of sand is carefully checked in the Wedron laboratory during washing, drying and grading operations.

99.9% PURE SILICA
WEDRON
SILICA COMPANY
INDUSTRIAL SAND

Does Your Casting Operation Require Controlled Quality Sand?

The chances are good that you need far better casting sand now than you did 10 years ago, or even five. Methods have changed and so have sands. Sand nowadays must be graded very carefully by well equipped plants. Inspection and control is highly important in modern sand processing. This takes competence and technical knowledge. You just can't dig it up and ship it.

This is why it pays you to buy your foundry sand from Wedron. We regularly process, as standard, 17 grades for foundry use. Each is a uniform, white, and rounded grain sand, ideal for making high quality castings.

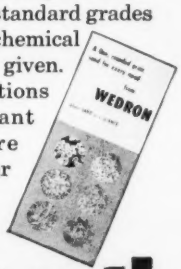
In addition, we offer 7 grades of ground silica flour, each also closely controlled to meet rigid specifications.

Our deposit is the finest raw material—white rounded grain sand from the famous Ottawa-Wedron district. These sands are thoroughly washed, screened, dried, inspected and bagged in our modern plant. They are then delivered to you as the finest foundry sand product available today.

Why not make your next order Wedron? You will be surprised at the increased quality you get for your sand dollars.

NEW SAND BOOKLET

This new booklet gives all the details on Wedron Sands for all kinds of industrial uses. Complete descriptive folder details the Wedron processing operations which produce the finest rounded grain silica sands. 24 separate standard grades are tabulated and chemical analysis of sand is given. Numerous illustrations of the Wedron plant and facilities are shown. Send for your copy today!



WEDRON

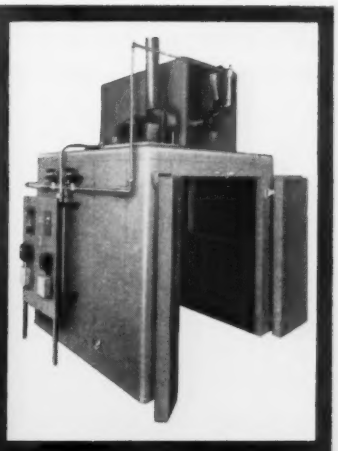
MINES AND MILLS IN THE OTTAWA-WEDRON DISTRICT
WEDRON SILICA COMPANY
135 South LaSalle Street, Chicago 3, Illinois

Foundry Products and Production Rates
Dictate Oven Requirements

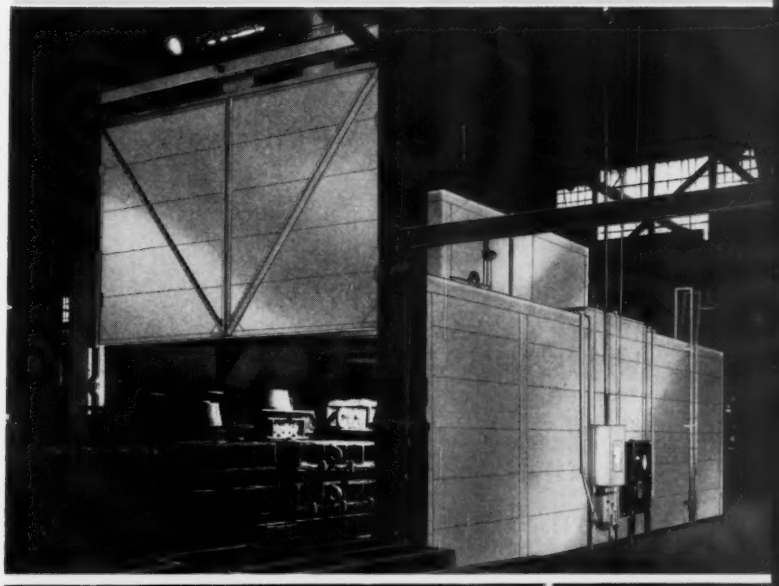
LANLY can meet any and all of yours

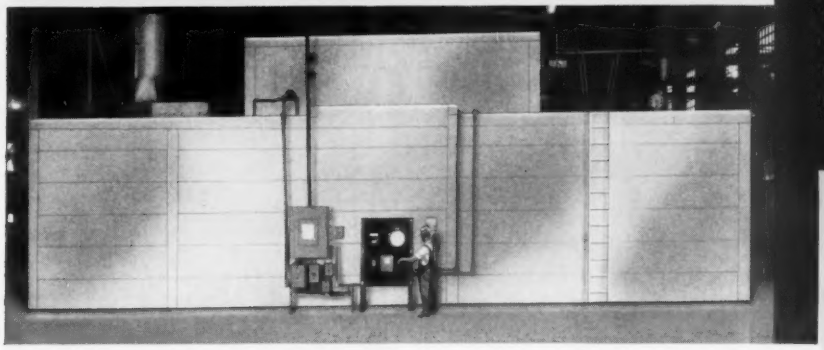
- from Small RACK TYPE OVENS

generally used when the baking of smaller cores is required in the production operation of your foundry.



-to Gigantic CAR TYPE OVENS





when the drying of large molds and cores for bigger castings is required.

This huge installation in the foundry of a large supplier of railroad products efficiently and economically carries its share of the load in the production of better castings.

Consult LANLY for a proposal on foundry ovens before you buy. A check of your present equipment may disclose a fuel eater, a core spoiler or a heat loser amongst them.

WRITE FOR THE LATEST CATALOG AND FACTS ON ANY INSTALLATION

THE Lanly CO.

FOUNDRY OVENS

780 Prospect Ave. • Cleveland, Ohio

burg Times Herald

JANUARY 15, 1957

BETTER PRODUCTS SECTION

PHOTO COURTESY AMPCO METAL, INC., MILWAUKEE, WIS.

LITHIUM DE-OXIDIZES HUGE COPPER CASTING

99.8% Conductivity Obtained

MINNEAPOLIS—Special

Ampco Metal, Inc., Milwaukee, Wis., obtained high structural soundness and electrical conductivity for the centrifugally cast copper ring (photo above) used in casting aluminum.

As-cast weight of the ring was 1800 lbs. Approximate as-cast size is 50" O.D., 6" thick.

LESS THAN 1/5 of a pound of metallic lithium added to the melt resulted in a dense, oxygen-free casting minus only .2% of being 100% conductive.

AS LITTLE AS 0.005% (2¼ gram cartridge) refines high temperature copper, brass, bronze, and nickel-silver, producing a sounder, more uniform casting.

THE SALTS of Lithium, Carbonate and Chloride benefit the heat treater by lowering bath melting points.

Is your foundry using Lithium? Our banks of electrolytic cells can supply experimental grams or commercial tons. Send for details.

(ADVERTISEMENT)

Lithium Firm Doubles Sales for 9 Months

Lithium Corporation of America, Minneapolis, reported Thursday that in the first nine months of 1956 its net sales were more than double those in the same 1955 period.

Herbert W. Rogers, president, in a report to stockholders, said sales were $8,699,028 in the nine-month period, compared with $4,276,... the same period a ye...

...1956 perio... ...ared wi...

Green Giant to Spend 2½ Millions on Can Plant and Warehouses

...t Co., Le Sueur, ...Tuesday it ...ed to a 47-per-cent increase ... net sales a... ...pared ... ...ss of...

...trends ahead in industrial applications for lithium

member of...

LITHIUM CORPORATION OF AMERICA, INC.

2600 RAND TOWER, MINNEAPOLIS 2, MINN.

PROCESSORS OF LITHIUM METAL • METAL DISPERSIONS
METAL DERIVATIVES: Amide • Hydride
SALTS: Bromide • Carbonate • Chloride • Hydroxide • Nitrate
SPECIAL COMPOUNDS: Aluminate • Borate • Borosilicate • Cobaltite • Manganite Molybdate • Silicate • Titanate • Zirconate • Zirconium Silicate

BRANCH SALES OFFICES: New York • Chicago • Bessemer City, N. C.
MINES: Keystone, Custer, Hill City, South Dakota • Bessemer City, N. C. Cat Lake, Manitoba • Amos Area, Quebec
PLANTS: St. Louis Park, Minnesota • Bessemer City, N. C.
RESEARCH LABORATORY: St. Louis Park, Minnesota

Circle 602 on Inquiry Card—Page 51

Circle 603 on Inquiry Card→

WANT TO MELT A MOUNTAIN OF METAL?

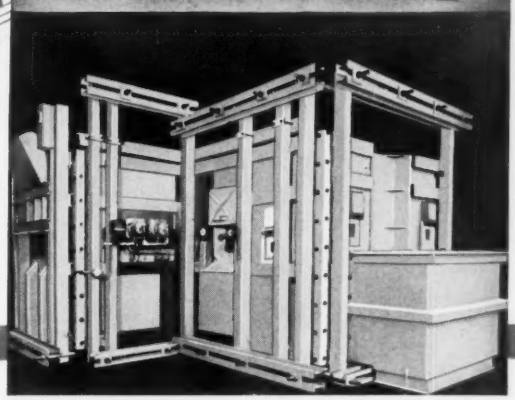
THESE BIG STROMANS WILL DO IT...*BUT FAST!*

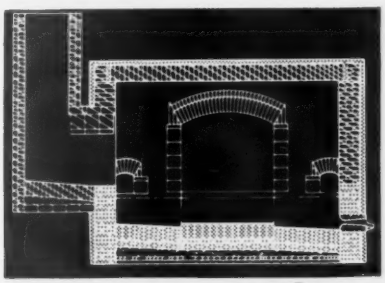
STROMAN LARGE SIZE REVERBERATORY FURNACES

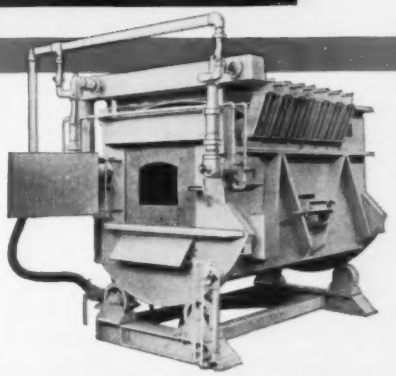
For Melting Unlimited Capacities of Aluminum, Zinc or Brass

These reverbs are built to assure heavy duty production for Smelting, Extrusion work, Die Casting, Permanent Molding and Foundry melting. Now in operation in some of the most prominent plants in the country, they have proved their ability to deliver large tonnages of metal, are easy to work with and are . . . operate most economically and are easy to maintain. Their efficiency and economy will amaze you and convince you of their superiority.

Furnaces of this type are designed to meet customers' individual requirements . . . let our engineers show you how to achieve utmost efficiency and economy in your melting operations.

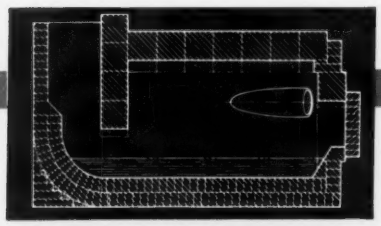




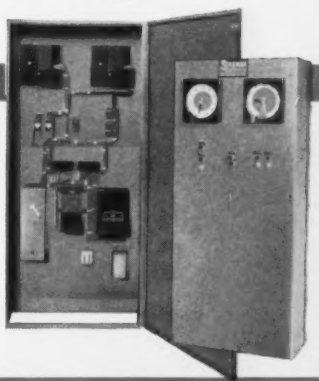


STROMAN TYPE "SW" CRADLE TILTING FURNACE FOR ALUMINUM MELTING SIZES FROM 1,000 TO 3,000 POUNDS

An ideal furnace for breakdown to supply hot metal to holding furnaces for die casting or permanent mold. Also for distribution to the molding floor in sand casting foundries. Tilted by means of an air or hydraulic ram. Furnished complete with gas or oil burners or combination burners, blower to furnish combustion air, and lining made of standard fire brick shapes.



Automatic temperature and safety controls available if desired.



STROMAN CUBICLE TYPE CONTROL PANEL

Stroman design monitor for furnace metal temperature, refractory temperature, high limit blower motor, circuit, electric ignition, and flame safety control, with completely automatic built-in warning system.

Don't forget STROMAN make furnaces for the melting of brass, bronze, aluminum, magnesium, grey iron and all other metals in sizes to meet your needs no matter how large or small.

Write for complete catalogue today!

STROMAN FURNACE & ENGINEERING CO.

DIVISION OF THE PETERSEN OVEN CO. • FRANKLIN PARK, ILL.

the Clearfield Mixer

This No. 404 Clearfield Mixer has been in operation for eight years in the core shop of the Railway and Industrial Engineering Co. of Greensburg, Pa., makers of electrical switchgear for substations and generating stations. During that time it has required only very few minor repairs and "has paid for itself many times over."

gives

you

BETTER FOUNDRY SAND

Better, because bond and moisture are uniformly distributed. By breaking down all lumps, caking is eliminated, freeing all material from the bottom surface. Clearfield Mixers, with vertical rotating mullers and unique rotating pans, are faster in performance and result in better production.

Write for Catalog No. 83. Gives full details on the Clearfield Mixer for your need.

CLEARFIELD MIXER

fast,
thorough
sand preparation

CLEARFIELD
MACHINE COMPANY
CLEARFIELD
PENNSYLVANIA, U. S. A.

Circle 604 on Inquiry Card—Page 51

USERS TELL HOW

K BOND CONES STAND UP BETTER

... snagging gray iron, malleable iron and non-ferrous metals with the profit-boosting "Touch of Gold"

Plenty of foundries report Norton K Bond CRYSTOLON* cones pay off in many ways. For example:

- *"K Bond cones hold form with no chipping. Best ever used."*
- *"Excellent cutting action. Cones lasted an average of 10 hours — longest service life we ever got."*
- *"These cones last us 50% longer than any others, and they're tops for fast cutting."*
- *"For durability and cut, K Bond* CRYSTOLON *cones are far the best we ever tested."*

That's why, every time K Bond cones or wheels go to work for you, you can count on "Touch of Gold" advantages like faster, freer cutting action . . . much longer wheel life . . . less frequent dressing . . . better corner holding . . . consistent duplication.

The Norton K Bond is the most radically improved vitrified bond ever developed for slow speed snagging of gray or malleable iron, or non-ferrous castings.

In particular, cones made of this outstanding bond and CRYSTOLON abrasive are free from the chipping and grooving of ordinary vitrified bond cones when snagging hard-to-get-at areas.

Your Norton Distributor

will gladly arrange a test of K Bond CRYSTOLON cones or wheels in your own foundry. Try them on your toughest jobs and get proof of how they'll snag off more metal per dollar and cut your cleaning room costs. Or, for more information write to NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors around the world.

W-1799

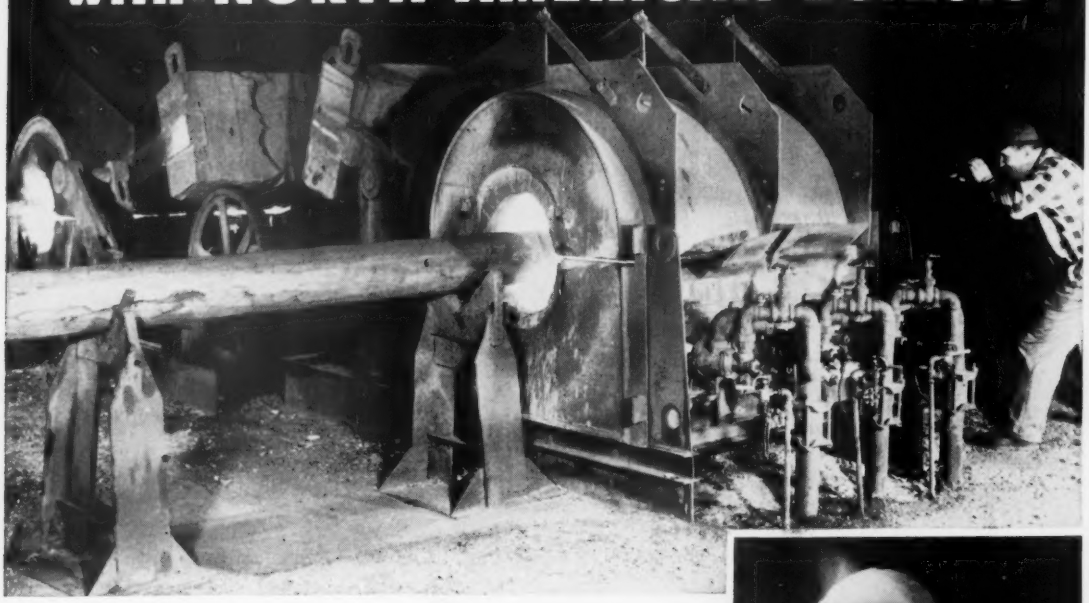
*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

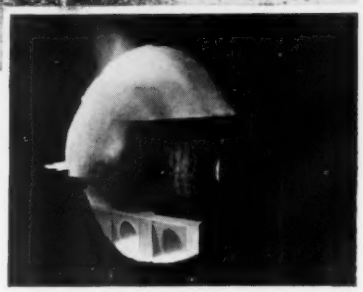
NORTON
ABRASIVES

Making better products . . . to make your products better

NORTON PRODUCTS: Abrasives • Grinding Wheels • Grinding Machines • Refractories
BEHR-MANNING DIVISION: Coated Abrasives • Sharpening Stones • Behr-cat Tapes

Huge Crankshafts
GET HOT IN A HURRY
with NORTH AMERICAN Burners





High speed heating, such as usually applied to small parts in mass production, is used by **Erie Forge & Steel Corporation** for heating huge locomotive crankshafts for die press forging . . . convincing evidence of the efficiency of North American Burners and Blowers.

Amazingly, **#6 oil** is used to fire these compact barrel-type furnaces. North American Blowers and Series 212 Burners provide thorough atomization for fast heat release.

8⅞" billets are heated from 1100 F to 2350 F in a day-long **average** time of 36.9 minutes. The result—superior quality metal. Average oil consumption is 32 gallons per ton of steel. It will pay you to look into the results you can expect by installing North American for high speed heat release.

Large photo shows 8⅞" billets in 2 of 8 small (36" I.D.) furnaces. Note Burners in right foreground.

Small photo is a close-up view showing burner tiles and flames whipping around a partially forged 10" crankshaft in a large furnace.

For detailed engineering information, consult your nearby North American combustion specialist. For equipment information, write for bulletin.

212

NORTH AMERICAN COMBUSTION Since 1917

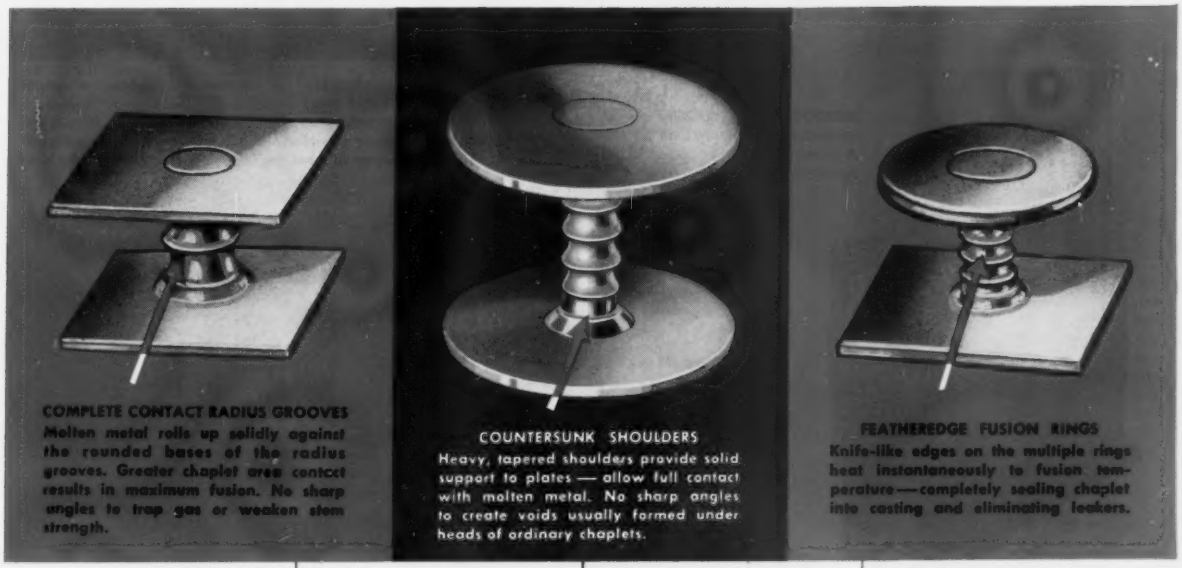
The **NORTH AMERICAN** Manufacturing Co.
Combustion Engineers
Cleveland 5, Ohio

better production . . . less waste . . .

fine FANNER

DOUBLE HEAD GROOVESTEM CHAPLETS

provide maximum fusion and solid core support



COMPLETE CONTACT RADIUS GROOVES
Molten metal rolls up solidly against the rounded bases of the radius grooves. Greater chaplet area contact results in maximum fusion. No sharp angles to trap gas or weaken stem strength.

COUNTERSUNK SHOULDERS
Heavy, tapered shoulders provide solid support to plates — allow full contact with molten metal. No sharp angles to create voids usually formed under heads of ordinary chaplets.

FEATHEREDGE FUSION RINGS
Knife-like edges on the multiple rings heat instantaneously to fusion temperature — completely sealing chaplet into casting and eliminating leakers.

FULL STRENGTH
Reinforced construction at all required points provides maximum support without use of extra heavy metal.

TIN OR COPPER COATING
The surest protection against rust, as well as aid to fusion. Readily alloys with iron and steel, lowering melting point and improving fusion. Also available in pure copper.

PRECISION TOLERANCES
Held to ± .002 on most sizes. Fanner reputation for accuracy is unequalled.

WIDE RANGE OF SIZES
Fanner Groovestem Double-head Chaplets are made in a variety of styles, in stem sizes from 3/16" to 1¼".

Fine Fanner Double Head Groovestem Chaplets are designed to take advantage of the characteristics of molten metal. Their exclusive design and superior construction assure the production of higher quality castings through solid core support . . . complete fusion . . . freedom from leakers and accurate wall thicknesses. Foundries doing critical casting work standardize on Fanner Groovestem Chaplets to secure maximum casting efficiency on every job. Find out how they can help you get better production, reduce waste and save money. Write for samples and prices now!

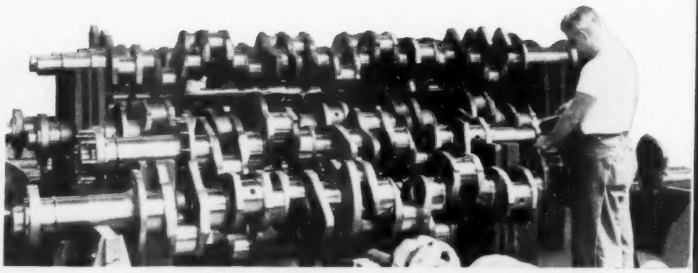
THE FANNER MANUFACTURING CO.

BROOKSIDE PARK CLEVELAND 9, OHIO

Designers and Manufacturers of Fine Fanner Chaplets and Chills

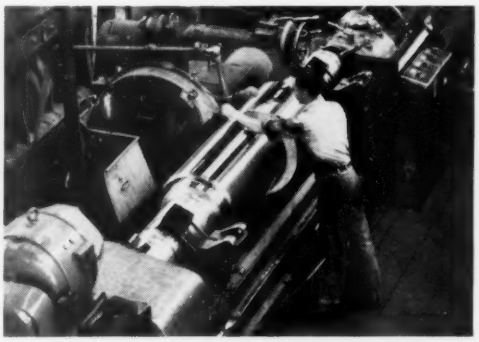
Chateaugay Pig Iron

MACHINABILITY—Die sets for the metal stamping industry must be accurately machined. The highly uniform distribution of chemical elements in Chateaugay produces a fine, dense grain structure resulting in excellent and economical machining. Dense grain structure also reduces loss rate caused by flaws.

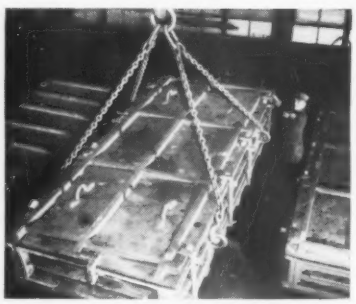


MINIMUM BRITTLENESS—A crankshaft manufacturer selected Chateaugay for three reasons: (1) Chateaugay reduces the combined carbon, thereby minimizing brittleness while still maintaining required physicals; (2) Chateaugay adds machinability; (3) Chateaugay reduces the possibility of porosity in the crankshaft casting.

FREEDOM FROM POROSITY—This end-frame housing for a power-squaring shear holds oil. A prime casting requirement is freedom from porosity—plus density, strength, wear-resistance. Using Chateaugay, the manufacturer produces castings with uniform soundness, close grain structure, strength, toughness, maximum resistance to wear.



WEAR-RESISTANCE—Chateaugay has been found ideal by foundries producing rolls used in making paper, plastics, rubber, and metals of all kinds. The exclusive inherent chemistry of Chateaugay tends to disperse the fine graphite flakes, producing a finer, condensed grain structure that gives the rolls increased wear-resistance and strength.



REPUBLIC CHAIN SLINGS meet lifting requirements. Heavy materials, such as castings and flasks, are handled efficiently and safely with Republic Chain Slings. Republic can furnish the proper type and fittings for all applications in alloy or high carbon steel, and wrought iron. Send coupon for catalog.

REPUBLIC MATERIALS HANDLING EQUIPMENT meets rugged service requirements. These PB-130 Box and Skid Units are used to move castings from foundry to machining line, then to storage for future use. Design and construction features assure long service life at lowest-per-year cost. Send coupon for facts.

REPUBLIC

REPUBLIC STEEL

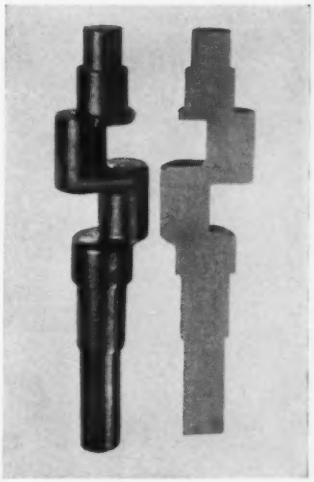
World's Widest Range of Standard Steels

meets all these casting requirements

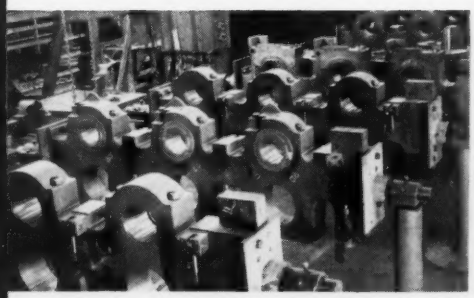
Chateaugay, Republic's exclusive premium pig iron, is used in the nine casting applications illustrated on these pages. It was selected to meet nine different and specific requirements, ranging from high strength and machinability to wear-resistance and dimensional accuracy in ductile iron.

Properties and characteristics of Chateaugay are unequalled by any domestic pig iron. For over 50 years it has helped foundrymen lick difficult casting jobs. It is exceptionally fluid—fills adjoining light and heavy sections completely—produces tough, sound castings accurate to patterns and shapes.

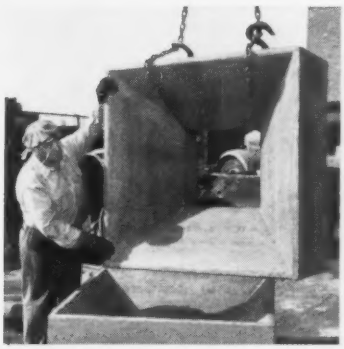
A Republic Pig Iron Metallurgist will show you how the uniform chemistry of Chateaugay, the low-phosphorus, copper-free pig iron, can help you produce consistently high-quality castings time after time. There's no obligation. Just mail the coupon.



FINE, UNIFORM GRAIN STRUCTURE — Cutaway shows excellent interior and exterior quality of a shell-molded, ductile iron crankshaft made with Chateaugay as the base metal. Chateaugay's very high carbon and unusually low sulphur, phosphorus, and manganese content make it ideal for ductile iron use. Its excellent physicals are maintained in the ductile form, assuring consistent top-quality castings.

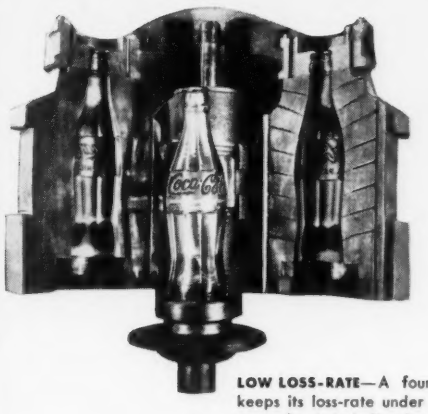


HIGH STRENGTH—Modern printing press design must provide both strength and extreme accuracy. That's why manufacturers specify Chateaugay for cast parts, such as the sideframes shown left. Chateaugay gives them the needed strength, plus fine grain structure for better and more accurate machinability.



HEAT-RESISTANCE—This chill or trough is used in directing the flow of molten chromium. Cast surfaces must withstand thermal shock, and must be highly resistant to corrosion. Chateaugay meets these requirements and also imparts an unusually fine grain structure with high wear-resistance.

DIMENSIONAL ACCURACY — Chateaugay was used as the base metal in this ductile iron sprocket and bevel gear. Photo reveals an exceptionally good surface. By using Chateaugay and the shell mold process, final machining was held to an absolute minimum.



LOW LOSS-RATE—A foundry producing glass molds keeps its loss-rate under 1% by using Chateaugay in every heat, including heats of nodular iron. The company's experience has proved that there is no better nor more economical means for insuring flaw-free, easy-to-machine castings.

STEEL

and Steel Products

REPUBLIC STEEL CORPORATION
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Send more information on:

☐ Chain Slings ☐ Materials Handling Equipment

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Company_____

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City_____ Zone____ State_____

shell molding helps cut cost in half

BEFORE: Ice-removal and scraper blades of steel formerly used in flake-ice making machines required expensive cutting, machining, drilling and welding.

AFTER: Manganese bronze blades cast in shell molds are ready for assembly after simple and inexpensive finishing operations, and have superior corrosion resistance.

...another report on economy...with **DUREZ RESINS**

ANALYSIS OF PARTS AND PROCEDURES with a view to cost-reduction made possible by shell molding with Durez resins often has very profitable results.

Production of these blades for the Carrier Corporation's Flakemaster ice-making machines formerly required a costly and lengthy manufacturing process. Carrier development engineers say the new blades, as shell-molded by Bennett-Ireland Inc., of Norwich, N.Y., meet their rigid specifications with but little finishing.

Durez phenolic resins are used throughout by Bennett-Ireland to obtain these results. The resins produce shells and cores of highly uniform grain structure and density, over a wide range of pattern temperatures and in sections with deep draws. Peel-back or fall-off on high projection patterns is eliminated. Superior hot and cold strength permits the most economical sand-to-resin ratios with Durez.

Perhaps you too can obtain substantially lower costs with the help of Durez resins. We will gladly help you find out. As a starter, let us send you a trial shipment.

• • •

For an authoritative and practical discussion of shell mold production with resin coated sand...simplified procedure, coating methods, test methods, etc.—let us send you the "Durez Guide To Resin Coated Sand." It's free on request.

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DUREZ PLASTICS DIVISION

HOOKER ELECTROCHEMICAL COMPANY

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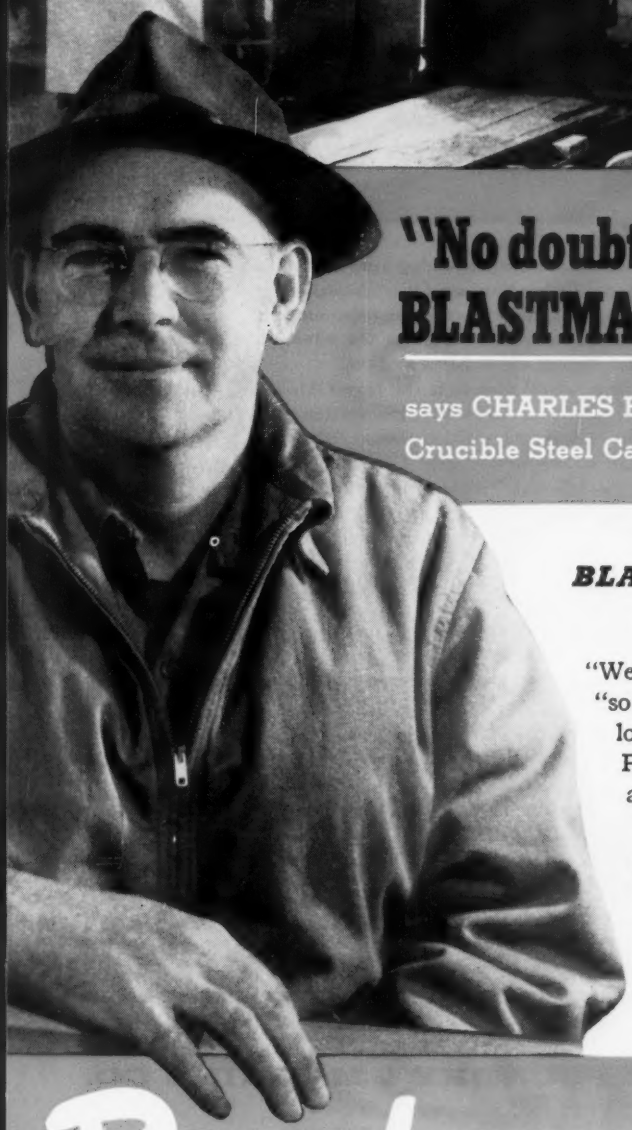
HOOKER CHEMICALS PLASTICS



"No doubt about it! That PANGBORN BLASTMASTER was a smart buy!"

says CHARLES BACHMAN, Plant Engineer,
Crucible Steel Casting Co., Lansdowne, Pa.

BLASTMASTER® has eliminated need for a second shift in this cleaning department.

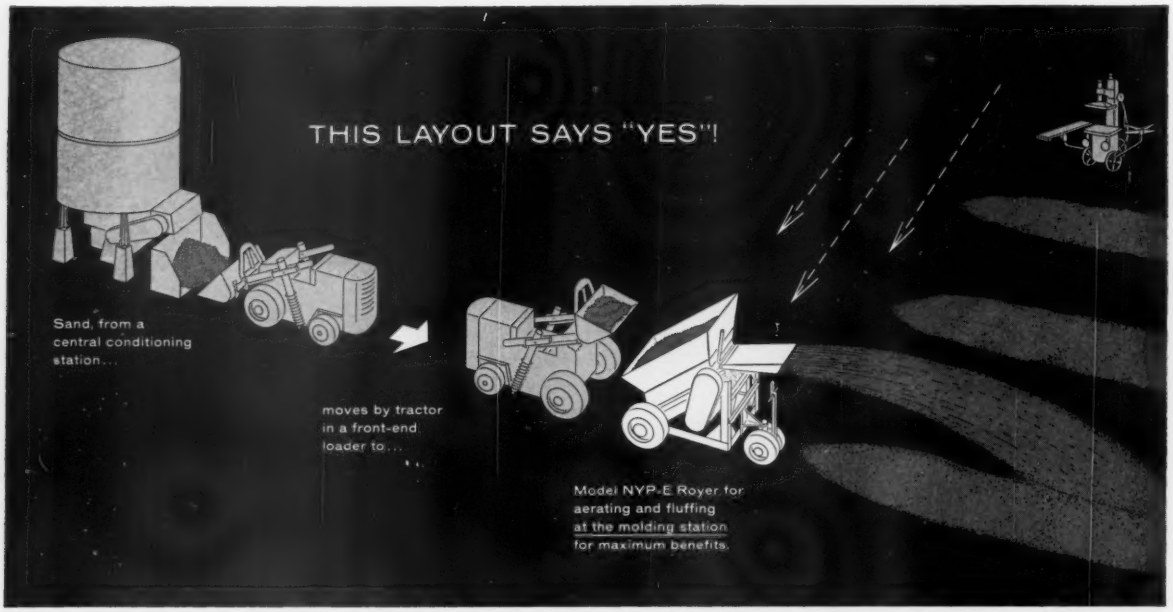
"We're interested in production figures," says Mr. Bachman, "so our blast cleaning equipment has to do good work at low cost. After studying the situation, we picked a Pangborn Blastmaster. It does the kind of job we like and its features are everything they're expected to be!"

If *you* need blast cleaning equipment, look at all makes. Then check the Pangborn Blastmaster. It offers many exclusive features plus a choice of sizes to fit your needs—1½, 3, 6, 12, 18 and 27 cu. ft. Write for Bulletin 703 to PANGBORN CORPORATION, 1400 Pangborn Boulevard, Hagerstown, Maryland. *Manufacturers of Blast Cleaning and Dust Control Equipment.*

Pangborn blast cleans cheaper

Circle 610 on Inquiry Card—Page 51

ASK YOURSELF . . . "CAN WE GET BETTER SAND, AND A BETTER SYSTEM, WITH A ROYER?"


THIS LAYOUT SAYS "YES"!
Sand, from a central conditioning station...
moves by tractor in a front-end loader to...
Model NYP-E Royer for aerating and fluffing at the molding station for maximum benefits.

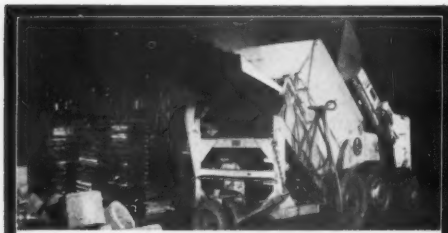
HERE'S HELP FOR YOU
Bulletin NY-54 for complete details and "specs" . . . an experienced Royer engineer to help you work out the system. Either or both for the asking.

Here is a positive cost-cutting sand conditioning system that falls within the budget limitations of the small or medium semi-mechanized foundry. It delivers better sand without adding to time or manpower requirements, and without the expense of complete mechanization. It gains the advantages of fluffing *after* handling, as the final step at the molding station.

An integral part of this practical system is the Royer Model NYP-E Sand Separator and Blender. It can be moved swiftly from station to station, delivering cooled, aerated, fluffed, perfectly conditioned sand right where it's wanted. With it you can *really* get all the advantages of central system sand control.

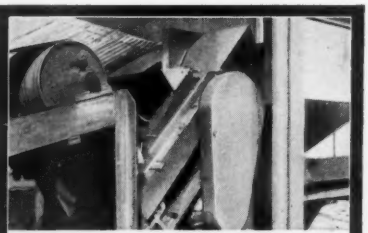
Maybe your system "is different." There's a versatile unit of the Royer "NY" Series to fit it . . . and *improve* it. As the photos show, there are stationary models for easy installation at the discharge of a muller or in conveyor systems. But, however you use it, the Royer vastly improves sand, saves time and money, improves yield and quality of castings—all at a *fraction of a cent per ton of sand.*

Note the special literature offer. Write, wire or phone today.



Teamed with front-end loader, a Royer NYP-E Portable moves from floor to floor in a grey iron foundry. What used to be caked, packed sand from mulling, now is a cool, fluffy pile.

"NY" Stationary in a different role—taking direct 1800 lb. discharge of stiff sand from a 9 ft. muller in a steel foundry.



Foundrymen insert versatile "NY" machines into conveyor systems wherever convenient. Result—perfect sand . . . no time hold-up.

Foundry-wise agents throughout the U. S.
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IN CANADA
Brown Engineering Corp.
15 Alcorn Ave., Toronto, Ont.

ROYER

ROYER FOUNDRY & MACHINE CO.
159 PRINGLE STREET / KINGSTON, PENNA.
FOREMOST IN SAND CONDITIONING EQUIPMENT

Thermex®
ELECTRONIC CORE-BAKING EQUIPMENT

"Core quality is unquestionably better"

Says Lebanon Steel Foundry

Discharge end of THERMEX Electronic Core Baker at Lebanon Steel Foundry which handles 3000 pounds of plastic treated cores per hour.

THIS 75 KW THERMEX* Core-Baking Unit was installed last October in the Lebanon Steel Foundry, Lebanon, Pa. Here's what Philip A. Repino, Plant Engineer, reports on one outstanding advantage proven in the first six months of operation:

"Core quality is unquestionably better. They are dried more uniformly. Scratch hardness and tensile values are higher. Cores are more uniform in size—require less filing and fitting."

This progressive steel foundry also found that electronic baking gives faster, smoother production—at lower cost! Power costs have been reduced from $4.00 to $1.20 per ton. Breakage has been cut to the bone and spraying eliminated. Storage space and rehandling are substantially less.

Find out—today—how *you* can improve *your* quality, increase production and cut costs with THERMEX Electronic Core-Baking Equipment. Call or write The Girdler Company, Louisville 1, Kentucky.

*THERMEX—Trade-Mark Reg. U. S. Pat. Off.

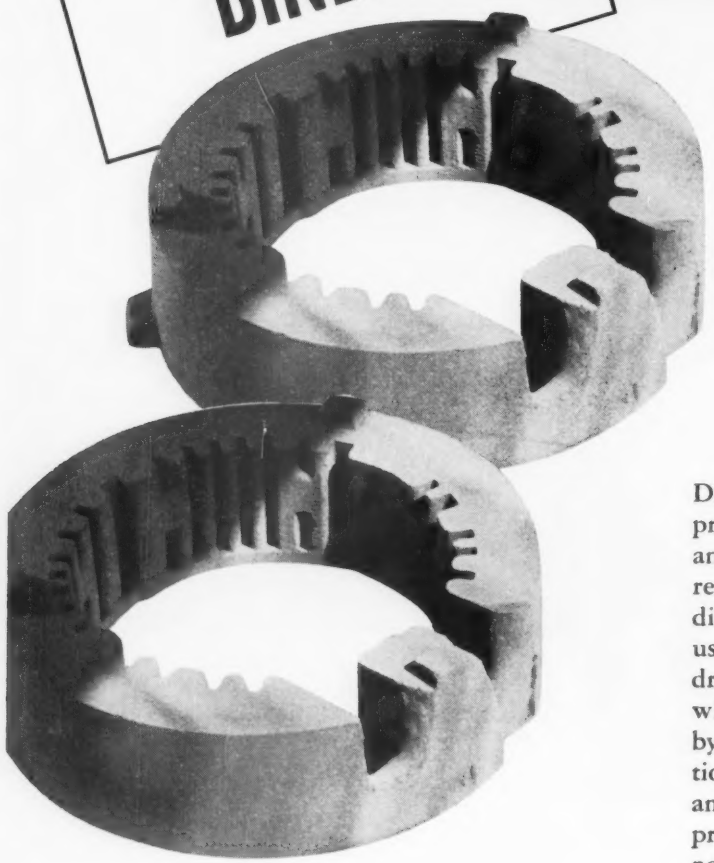
the **GIRDLER** Company

A DIVISION OF NATIONAL CYLINDER GAS COMPANY
LOUISVILLE 1, KENTUCKY
THERMEX DIVISION

DELTA DRI-BOND BINDER

DEVELOPS

HIGHER TENSILE AND COMPRESSION STRENGTH...
GREATER WATER PROOFING PROPERTIES...
HIGHER GREEN STRENGTH AND HOT STRENGTH



IN CORE SAND THAN ANY OTHER DRY BINDER TESTED

DELTA DRI-BOND BINDER is a product of several years of research and experimentation in our own sand research laboratory and proved by additional years of actual experience-in-use data compiled by prominent foundries. The excellent results obtained with Delta Dri-Bond Binder, reported by all sources, establish beyond question both the outstanding superiority and greater economy of this new product for use in steel, gray iron and non-ferrous foundries.

Cores made with Delta Dri-Bond Binder have excellent resistance to metal erosion, completely resist veining and metal penetration and shake out readily from the finished castings.

Get the Facts . . . Working samples and complete literature on Delta Dri-Bond Binder will be sent to you on request for test purposes in your own foundry.

DELTA

DELTA OIL PRODUCTS CO.
MANUFACTURERS OF SCIENTIFICALLY CONTROLLED FOUNDRY PRODUCTS

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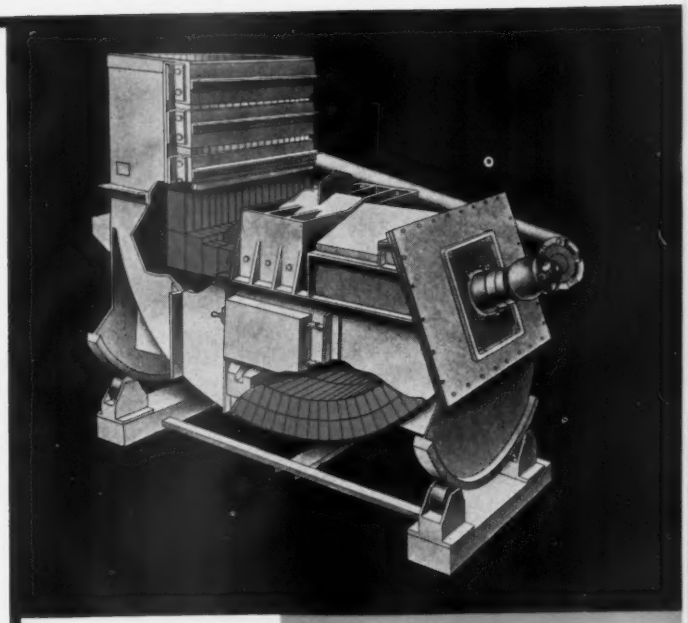
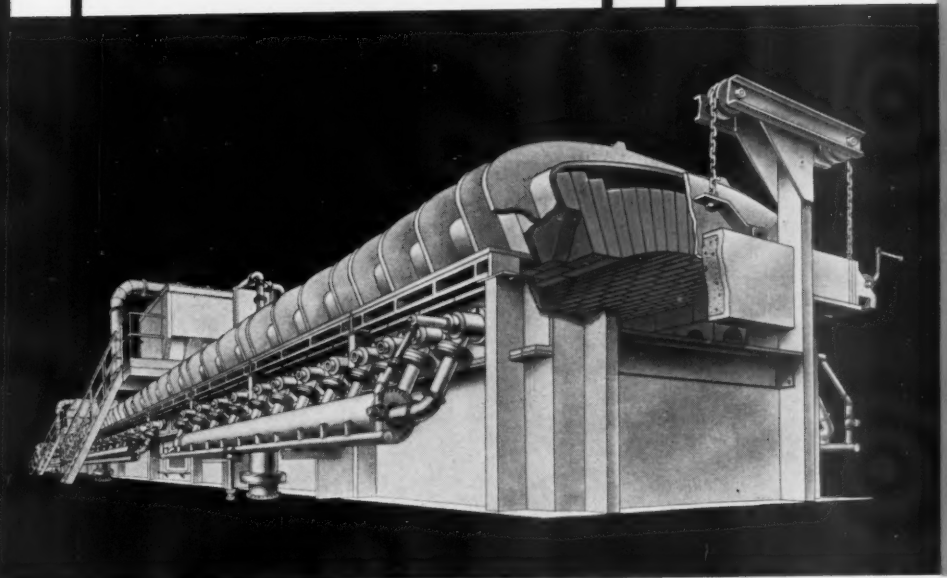
Why B&W Allmul Firebrick withstand punishing service in furnaces like these



▲ Direct-fired reverberatory furnace for melting brass, aluminum, and iron. For longer refractory life, B&W Allmul Firebrick are used to line the bath and arch.



◀ In this type of furnace for continuous high speed heating of strip for welding into pipe, temperatures in excess of 3000 F are common and the atmosphere is contaminated with iron oxide. Because of their resistance to spalling and metal penetration, B&W Allmul Firebrick have set new standards for refractory life in bungs, burner blocks and recuperators.

B&W Allmul Firebrick stand up under extremely high temperatures at continued high rates of operation because they are produced from electrically melted mullite grain by a highly efficient process. These top-quality brick have high hot-load strength, high resistance to spalling, good volume stability and a melting point of 3335 F.

They are practical from a cost standpoint for a wide range of applications in the ferrous and non-ferrous metal industries. Illustrated on this page are a butt-weld furnace as well as a direct-fired reverberatory furnace. Other services are direct and indirect-arc electric furnaces, air furnaces, furnace hearths subject to iron oxide scale attack, crucible melting units and furnaces melting many non-ferrous metals and alloys.

Your B&W representative can show you how B&W Allmul can lower your refractory costs in many heavy-duty services. Consult him or write for Bulletin R-34A, giving data on B&W Firebrick for exacting services.

B&W REFRACTORIES PRODUCTS: B&W Allmul Firebrick • B&W 80 Firebrick • B&W Junior Firebrick • B&W Insulating Firebrick • B&W Refractory Castables, Plastics and Mortars • B&W Silicon Carbide

BABCOCK & WILCOX

THE BABCOCK & WILCOX CO.
REFRACTORIES DIVISION
GENERAL OFFICES: 161 EAST 42nd ST., NEW YORK 17, N.Y.
WORKS: AUGUSTA, GA.

Circle 614 on Inquiry Card—Page 51

R 887

Fast Delivery!

INTERNATIONAL
TYPE LJS
JOLT SQUEEZERS

- Portable or Stationary
- 4" dia. Jolt Cylinder
- 10" dia. Squeeze Cylinder
- 5" dia. Jolt Cylinder
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- Platen alignment always accurate and quickly adjustable
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The "Behemoth" of Jolt Squeezers

Low Maintenance Cost

Machine Sold Complete with

1. Vibrator
2. Match Plate Holder
3. Pop Valve
4. Air Gauge
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6. Cleaner Valve
7. Automatic Lubrication
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Long-lasting because of Sturdy Construction - extra heavy weight

INTERNATIONAL MOLDING MACHINE CO.

LA GRANGE PARK, ILLINOIS • (Suburb of Chicago)

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"Sand Magic with Plasti-Bond"

SAND MAGIC WITH...
PLASTI-BOND
New sand flexibility and versatility to speed foundry operations, cut costs, improve castings and boost profits
EASTERN CLAY PRODUCTS DEPT.
International Minerals & Chemical Corporation
20 North Wacker Drive
Chicago 6

You can really do sand tricks with Plasti-Bond, tricks that will give you a lot of practical help on your troublesome sand problems. It's well worth your while to investigate.

International Minerals & Chemicals

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Circle 616 on Inquiry Card—Page 51

for higher performance it's

OHIO MAGNETS

Size for size, Ohio Magnets lift larger loads over longer periods because they *operate cooler*. So for extra magnet lifting power, extra magnet value—always specify Ohio Magnets and Ohio Magnet Controllers. There's a type and size for every lifting job. Send for free copy of Bulletin 112, or consult the Yellow Pages for Ohio offices in principal cities.

AA-1477

THE OHIO ELECTRIC MFG. CO.
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CHESTER BLAND
President

Ohio Also Makes Separation Magnets • Nail Making Machines • Fractional Horsepower, Shell and Torque Motors

6 ways

to assure good surfaces on shell-molded castings

Smooth castings that require a minimum of finishing are a major advantage of shell molding. Don't lose it through surface roughness that may cause otherwise sound castings to be rejected. Here are six ways to assure good surfaces on shell-molded castings:

1. Pour at the correct temperature. Usually, the lowest permissible pouring temperature results in the smoothest surface.

2. Check for poorly filled shells. Low density shells often cause roughness.

3. Avoid nozzle ingates. Increase ingate areas or choke the runner system.

4. Avoid metal inclusions. Keep runners full at all times, especially with drossing and high temperature alloys.

5. Position horizontally. This reduces metallostatic head, thus decreases tendency of metal to penetrate shell.

6. Check sintering point and grain size distribution of sand.

One thing more. Use a top-quality resin. G-E resins are preferred by many foundries for their good flow properties, fast cure, fine particle size and excellent release properties. Try them. And write today for a helpful brochure, "59 Answers to Your Shell Molding Problems".

GENERAL ELECTRIC COMPANY, Section F-4, Chemical Materials Department, Pittsfield, Mass.

Progress Is Our Most Important Product

GENERAL ELECTRIC

DESULPHURIZATION...

LINDE's desulphurization method, for use with calcium carbide, is simple, efficient, and economical. The principal parts, shown here, are nitrogen supply, dispenser, and injection tube.

You get uniform results with Metallurgical Carbide from LINDE

In the foundry, you can produce high grade iron only by making sure you use metal with a low sulphur content. As a desulphurizing agent, metallurgical calcium carbide assures *uniformity* in the metal you produce. You know in advance that by adding a certain amount of carbide you remove a certain percentage of sulphur. Because metal specifications can be met efficiently and economically with carbide, you eliminate any need for wasteful "trial and error" methods.

Linde's method of mixing UNION calcium carbide and molten iron is simple and sure. A stream of fine mesh carbide and nitrogen under pressure is forced from a dispenser through a hose. The graphite injection tube is immersed deep in the hot metal. The carbide blends evenly and thoroughly with the iron. Desulphurization with UNION calcium carbide creates no fumes, does not attack refractories. The LINDE equipment—nitrogen supply, dispenser, and injection tube—is easy to operate and maintain.

If you would like more information about LINDE's method of desulphurization, using calcium carbide, just call or write your nearest LINDE office. LINDE COMPANY, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N. Y. Offices in other principal cities. In Canada: Linde Company, Division of Union Carbide Canada Limited.

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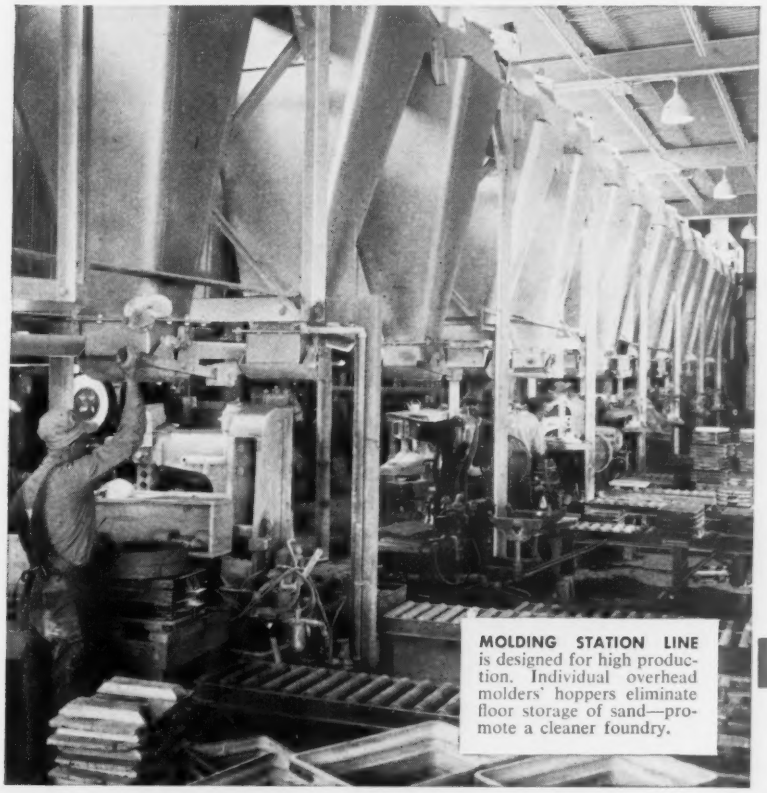

MOLDING STATION LINE is designed for high production. Individual overhead molders' hoppers eliminate floor storage of sand—promote a cleaner foundry.

System at A. B. Chance non-ferrous foundry holds down unit costs, utilizes maximum use of manpower

LIKE other progressive foundries all over the country, A. B. Chance Co. of Centralia, Mo., has found Link-Belt sand handling mechanization the key to more profitable operations. By improving the quality of their prepared sand, this foundry reduced scrap and increased production. Also, working conditions were improved because the foundry was made cleaner and more orderly.

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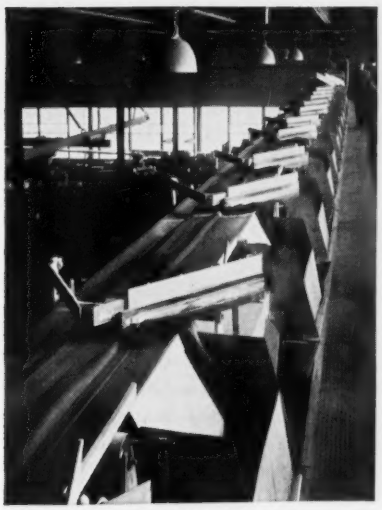
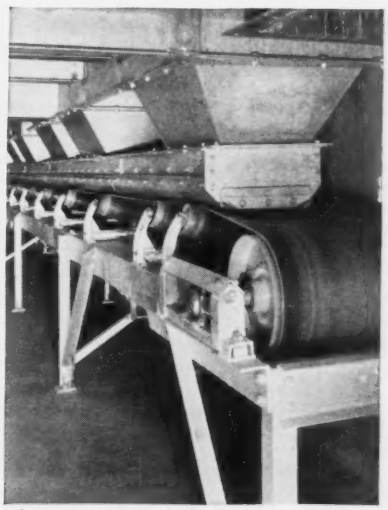
LINK-BELT

CONVEYORS AND PREPARATION EQUIPMENT



DISTRIBUTING BELT CONVEYOR delivers prepared sand to molding stations directly below. System is designed to handle approximately 40 tons per hour of prepared sand for production of brass and aluminum castings.

PADDLE MIXER combines water with shakeout sand from storage bin producing a uniform molding sand. Link-Belt makes single- and double-shaft mixers in a range of capacities.



TRANSFER BELT CONVEYOR under floor receives shakeout sand through grates and transfers it to bucket elevator. Conveyors can be equipped with magnetic devices to remove ferrous metal particles.

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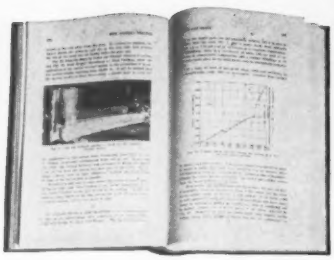
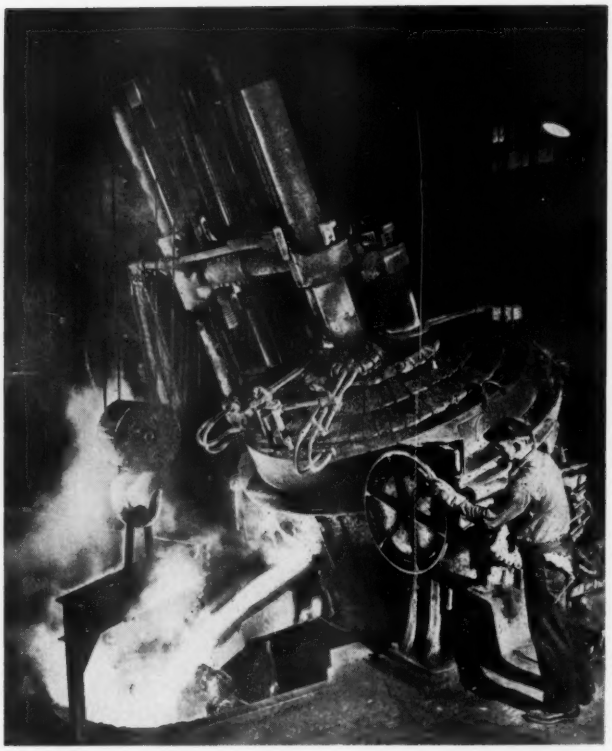
STEEL FOUNDRY PRACTICE

By JOHN HOWE HALL





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Mr. Hall was associated with the production of castings for nearly 50 years as an employee of various producers and as a consulting metallurgist. He was the author of *The Steel Foundry*, which was published in 1914, with a second edition in 1922, and wrote many technical papers. In 1924, Mr. Hall received the first Whiting Medal awarded by the AFS.

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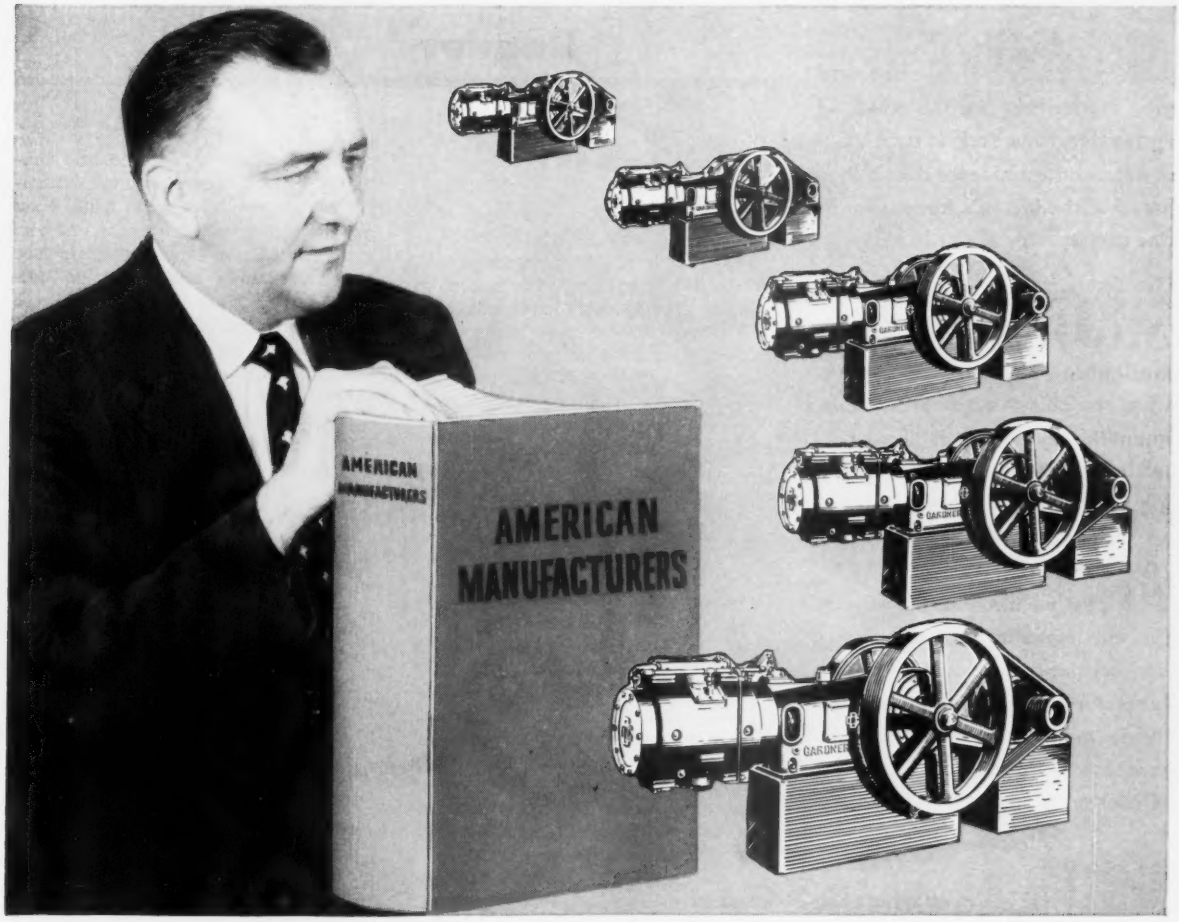

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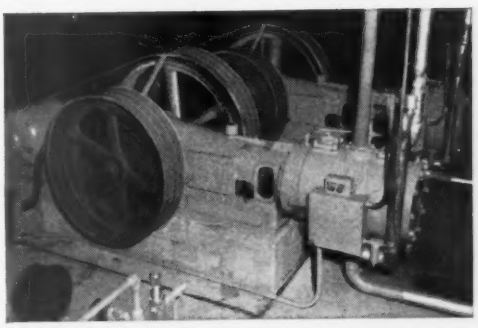

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Readers' Comment

Sell More Castings

TO THE EDITORS:

The marketing stories in your May issue were very helpful. We are pleased to see that this important subject is beginning to be given serious attention by foundrymen.

We hope we will see many more marketing stories in your magazine.

G. J. COOK
Manager-Marketing
General Electric Co.
Foundry Department
One River Road
Schenectady, N. Y.

•

TO THE EDITORS:

May I take but a moment of your time to congratulate you and the other members of FOUNDRY's editorial staff for what is unquestionably an exceptionally fine issue of my favorite magazine for the foundry industry.

Your May issue is a veritable compendium of expertly edited, thoughtfully assembled, and unusually timely technical information, and I can readily appreciate the tremendous effort that must have gone into readying this important contribution.

I thought Bill Gude's article on "Foundries Can Sell More Castings," and Jack Miske's treatise on "Research and Product Development" especially outstanding, and it is my hope that foundrymen will take these hints to heart, because I can certainly attest to the need for this information.

HANS J. HEINE,
Technical Director
ASM Publication Development Division
American Society for Metals
7301 Euclid Ave.
Cleveland 3, O.

Recruiting Engineers

TO THE EDITORS:

Several of us were very much interested in your "How a Foundry Can Recruit Engineers" in the April issue. We believe that your article will have a considerable influence in getting foundrymen to take a realistic look at the situation. And we mean this from the foundrymen's standpoint; we are embarrassed in all the colleges by many more demands for graduates than there are seniors available.

Quite a number of our important industries—aircraft, petroleum, communication—have been pretty well taken over by what might be called "egg head" engineering. The manipulators of mathematics and advanced physics produce structures and machines which surprise even themselves. Every once in a while they go completely off the beam and the practical fellows laugh at them. But they start over again and do better the next time. I wonder if there is not a possibility that the making of castings will suddenly become super-technological in terms of highfalutin' mathematics and solid state physics.

When it does, there will need to be a lot of men in the industries who will know how to interpret the long hair guys to the men in the shops who actually melt and mold.

I tried to hint at all of this in a talk before the Steel Founders' Society of America at the Drake Hotel a year or two ago, but I strongly suspect that I did not make much of an impression.

Anyhow, we much enjoyed your article.

Since we are a co-operative college, we suggest the addition of co-operative arrangements with the colleges as a fourth source or approach.

C. J. FREUND
Dean of Engineering
University of Detroit
Detroit 21, Mich.

Favors Castings Show

TO THE EDITORS:

We liked the idea of the castings show for the "off year" and had some of our design people there to benefit by it. Your editorial in the June issue sums it up very well. Too much casting work has been lost to the industry because of our neglect of this type of promotion.

R. J. PORTER
Superintendent, Pattern Shop
Electric Boat Division
General Dynamics Corp.
Groton, Conn.

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TO THE EDITORS:

The April issue of FOUNDRY is, as usual, excellent in all respects.

We particularly want to compliment you and your staff on the nice handling of a section of our Design Chapter. Yesterday we figured out that over 50,000 copies of the complete handbook chapter are, or will be, in circulation shortly. This is quite an item.

DONALD H. WORKMAN
Executive Vice President
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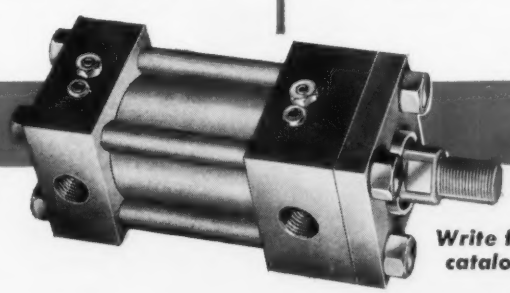

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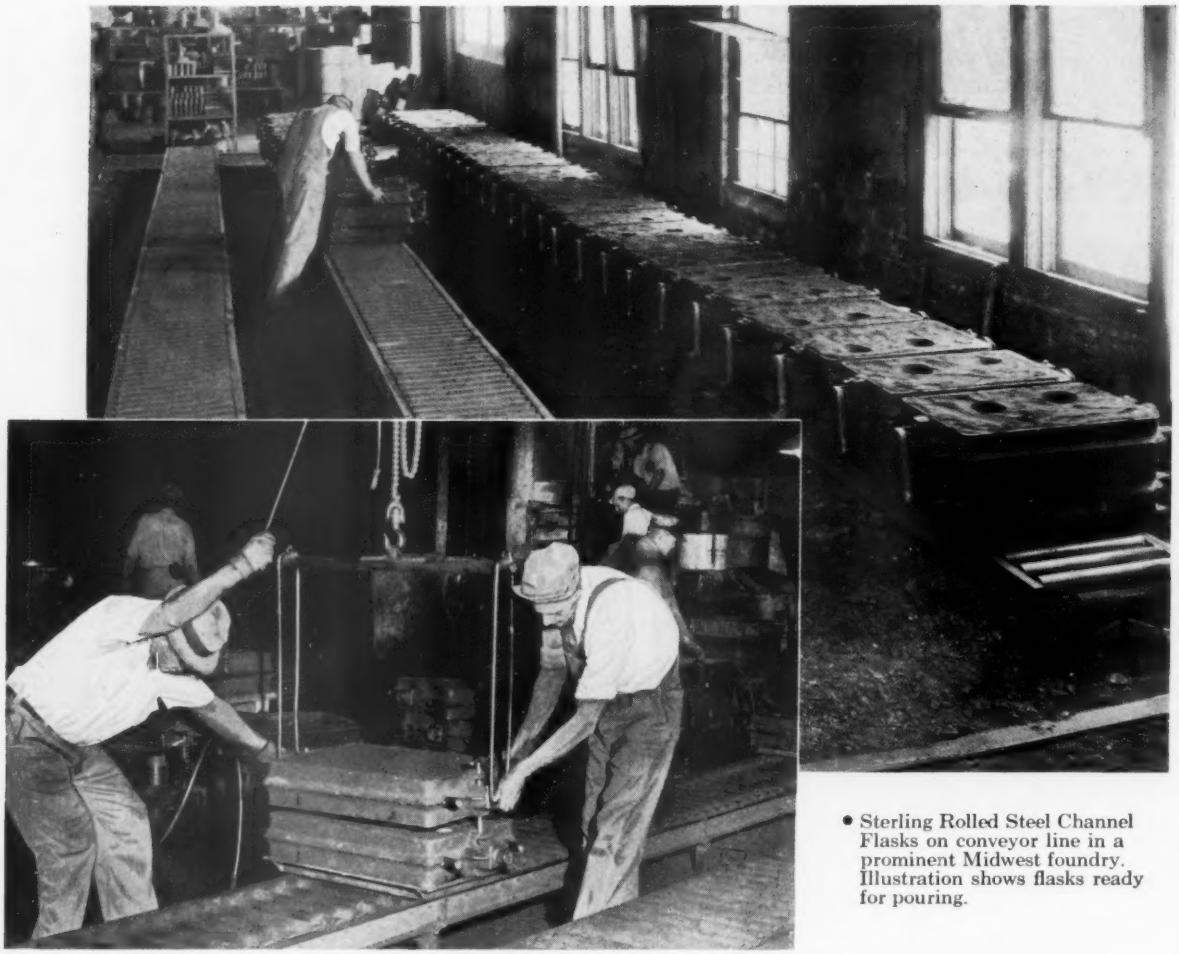

• Sterling Rolled Steel Channel Flasks on conveyor line in a prominent Midwest foundry. Illustration shows flasks ready for pouring.

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Are We Slipping?

American industry has made tremendous progress in mass production. Through the development of machines, the application of material handling equipment, and more recently the introduction of automation, huge quantities of a wide variety of products are turned out rapidly. America today could not enjoy its high standard of living without mass production.

But in our scramble to produce things in quantity, are we losing the ability to produce things that are well made? Is the old American philosophy, carrying with it a pride of workmanship and of product, being forgotten? Are we giving lip service to the principles of quality control without really applying these principles to our manufacturing operation? Talk to people who are buying consumer durables and you cannot escape the conclusion that in all too many instances, the quality that is advertised and the quality that is being delivered to the purchaser vary widely.

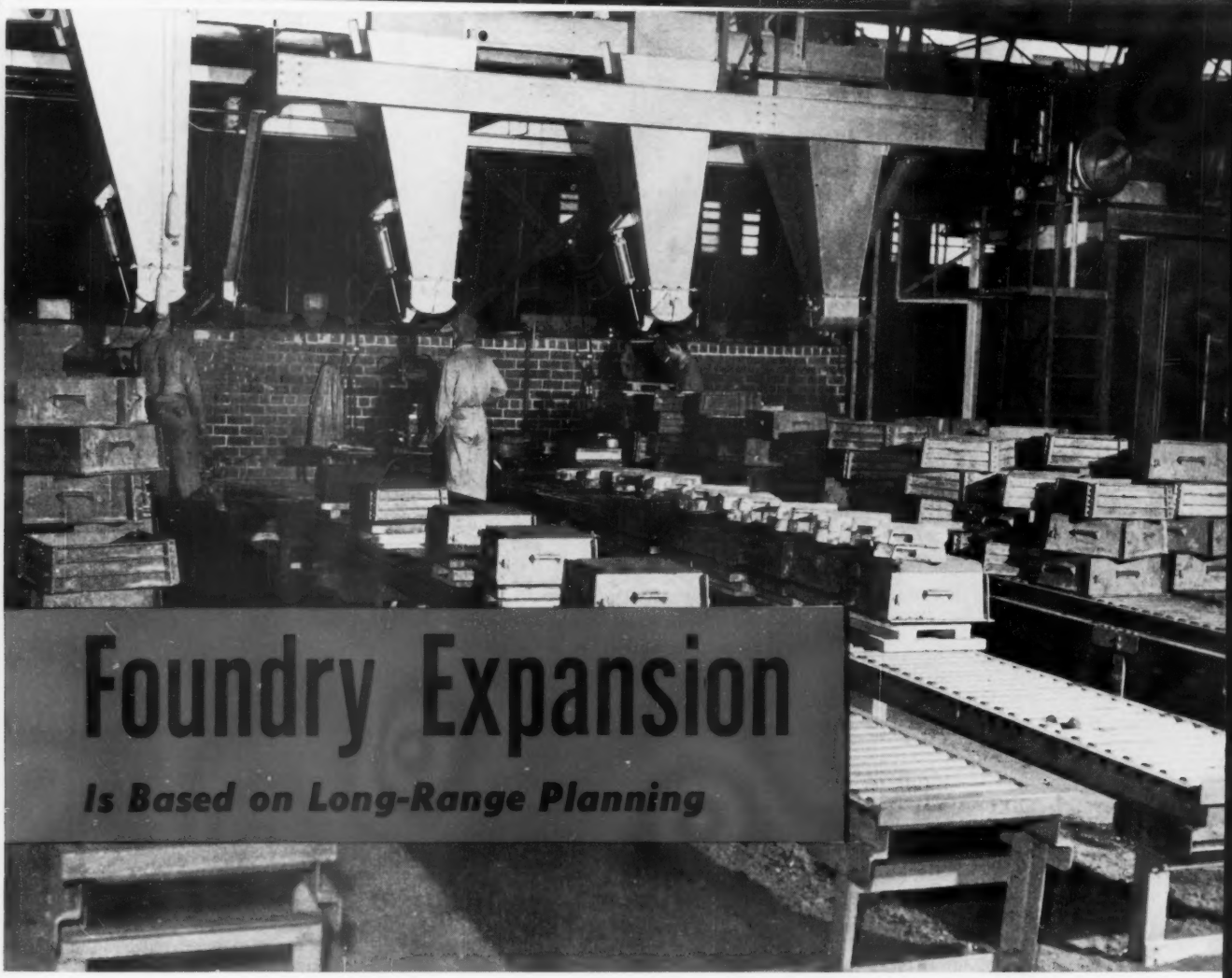
As an example of the situation, consider what is happening in the field of automobiles, one of the early mass produced items. Many buyers of these modern cars will tell you that it is necessary to return the car to the dealer's service department many times "to get things fixed." One of our editors took delivery on a new car last week, and after several days reported that he had never before purchased a car that had so many things that just would not work. Similar comments are heard frequently. And the sad truth remains that often these so-called "minor adjustments" never are completed to the satisfaction of the customer. The irritations developed following purchase continue throughout the ownership of the car or any other article where quality has not been pitched to a high standard.

Foundries must not succumb to this malady. Castings not only are in competition with themselves, but with various forms of components produced by other types of fabrication. While castings can compete successfully with these products—thanks to such factors as excellent physical and mechanical properties, ease of producing intricate shapes with dimensional accuracy, adequate sources of supply, and price—sales will not continue if quality is neglected.

Automobile manufacturers probably are a lot fussier in the quality of castings purchased than in the quality of cars delivered to their customers. Other buyers of castings are just as critical.

So let's increase the drive to provide top quality for every casting delivered.

Frank G. Steinbach
Editor



Foundry Expansion

Is Based on Long-Range Planning

Management efforts which developed the co-ordinated, long range expansion plans also show up in efficiency of the foundry operation. Scrap over an 11-month period was less than ¾ per cent

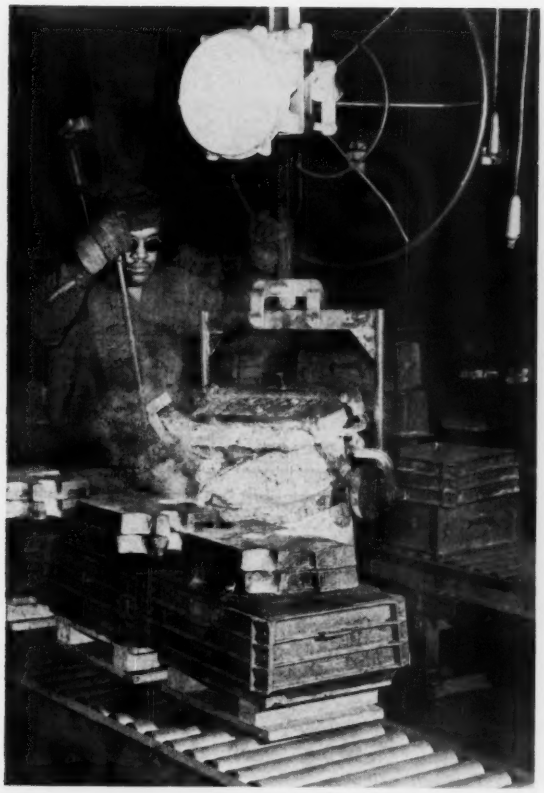
By ROBERT H. HERRMANN
Associate Editor

QUINCY Iron Foundry Div. of Gardner-Denver Co., Quincy, Ill., has completed part of a long-term expansion program. Building additions include a 60 x 160-ft section housing casting cleaning operations and some floor molding work, and a 36 x 120-ft core oven room addition to the iron foundry. The addition, housing the new brass foundry, measures 50 x 280-ft. Two new rooms for lockers and wash-up facilities cover a 24 x 140-ft area.

The brass foundry was moved to Plant 1 from the Walton Heights plant during three weeks, two of which were regular vacation time. Building construction and equipment installations in the iron foundry took place with no interruption of production.

First orders for the project, including new equipment, were placed in October, 1955. The new additions were in full production on Aug. 1, 1956. Good planning on the part of the Gardner-Denver staff, and fine co-operation from all suppliers made that accomplishment possible. As part of the continuing expansion program, a new chemical and metallurgical laboratory addition is nearing completion.

Statistics for the first 11 months of 1956 give some insight into the efficiency of the Quincy Iron Foundry operation. Foundry scrap was less than ¾ of 1 per cent. Total foundry and machine shop scrap was 1.48 per cent. These figures are based upon production of 7,363,136 lb at a cost of 13.8 cents per pound of finished castings delivered to the company machine shop. Man-hours of production and supervisory personnel were 51.89 per ton. Castings range from 1000 lb to 11½ tons. They are highly cored components going into compressors, pumps, air motors and hoists, mine car loaders, rock drills and contractor and

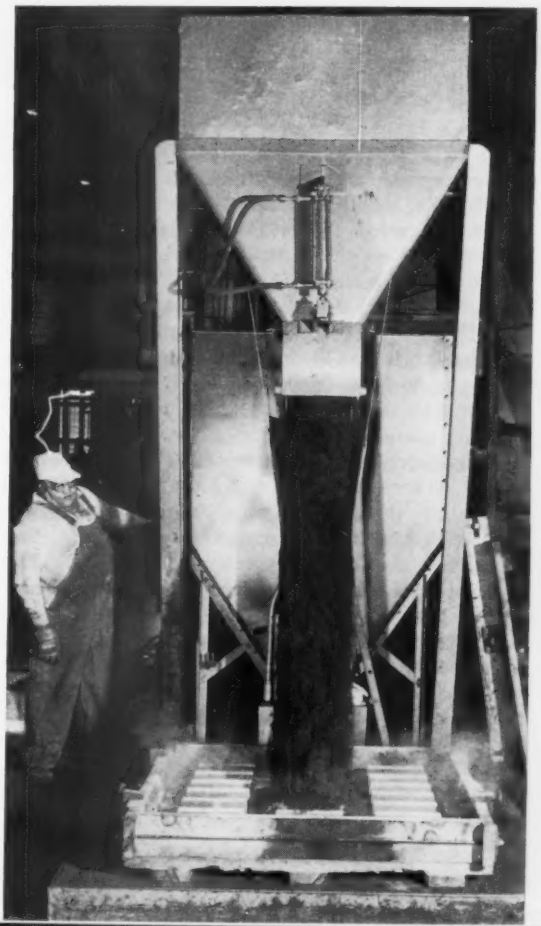


An overhead monorail system permits the pushing of ladles between the melting and pouring areas

Worker uses a crane hoist with bail attachment to close a mold on the gravity roller conveyor

Partial view of the nonferrous foundry molding area, showing jolt-squeeze machines, overhead sand hoppers and finished mold set-off conveyors

Large molds are made on a floor jolt unit. A bucket elevator lifts sand from a floor level hopper to overhead chute used to fill flasks

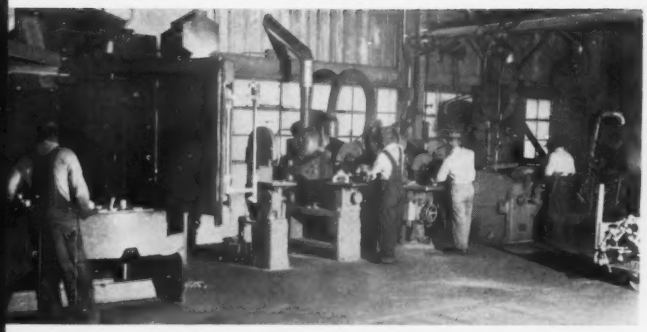


maintenance tools produced by the parent firm.

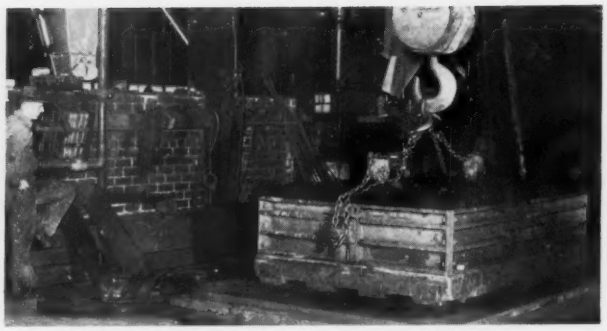
During 1956, production in the brass and aluminum foundry was split between the old and new shops. Man-hours for that year were 127 per ton of finished castings, compared with 136 for 1955. Total 1956 foundry and machine shop scrap was 4 per cent.

Nonferrous Foundry Operations—The brass and aluminum foundry, housed in the new 50 x 280-ft building addition, is well lighted and ventilated by two banks of windows—one placed high in the wall and the other at eye level. Additional light is provided by electrical fixtures at work stations. Ceiling fans exhaust fumes and dust. Brass and bronze castings from 1 oz to 1450 lb are produced. Aluminum castings weigh from ½ oz to 15 lb.

The new foundry is equipped with four jolt-squeeze machines for snap flask work. Additional space is provided for future installation of two more machines. Molds are made in 11 x 15, 12 x 18, 13 x 17, 14 x 14, 14 x 16 and 16 x 16-in. snap



View of nonferrous cleaning room shows a blast table, cut-off wheels, a band saw and grinders



Mold halves for large iron castings are rammed on a jolt machine mounted in the foundry floor

flasks. All molds are jacketed for pouring. Two gravity roller conveyors about 2 ft off the floor extend behind each machine. One is for set-off and pouring, the other for return of empty flasks.

Two larger jolt-squeeze machines handle cope and drag work in 24 x 28-in. flasks. Here, too, additional space is provided for two future machines. Three gravity roller conveyors carry molds and flasks. Occasionally some molds are set out on the floor if they are to be poured with an alloy not immediately available.

Molds are dumped out over a floor grating. A fork truck with crane arm and bail attachment is used to dump the larger molds. A vibrator attached to the bail aids in removing sand from flasks. Castings are loaded into tote boxes and moved to the cleaning room by fork truck.

Large molds are made on a floor jolt unit measuring about 4 x 5 ft. Sand is fed to flasks from an overhead chute fed by a bucket elevator which picks up sand from a floor level hopper.

Sand from shakeout falls through floor gratings to a below-floor-level belt conveyor for movement to a bucket elevator, which deposits it in a 35-ton capacity bin over the 750-lb capacity muller. Batches are mixed for 1 minute in the automatically cycled muller. Water is metered, and additions of southern and western bentonite are made to the natural sands by hand as needed. Prepared sand is dumped from the muller through a chute to a bucket elevator, which empties to an overhead belt conveyor feeding molding machine hoppers. A fork truck carries sand in a drop-bottom tote box to the hopper on the floor jolt molding system.

Each batch of sand is tested. Properties are 6 to 6.5 per cent water, 9 to 13 psi green compression strength and 25 permeability. Core sands are prepared in the common coreroom serving both foundries. Baked cores are brought to the brass and aluminum foundry in boxes carried by fork trucks.

Nonferrous Melting—Five tilting furnaces which burn either gas or oil melt the six brass and bronze alloys and two aluminum alloys poured in the foundry. Furnaces have a capacity of 820 lb of brass or bronze and 230 lb of aluminum. The row of furnaces is hooded and vented.

Molten metal is tapped directly into pouring ladles carried in pouring devices suspended from an overhead monorail conveyor. Switches in the conveyor permit movement of the ladles to pouring areas behind each molding station.

Castings first are cleaned on a 6-ft-diam rotating table blast with No. 230 steel shot. Then gating metal is removed by two cut-off wheels or a band saw. Castings are ground on a double-end or single-end stand grinder. Air contaminants from cut-off and grinding equipment are vented through a down-draft system to a wet dust collector.

Additional casting cleaning equipment includes a reach-in grit blasting cabinet and four benches where men work with portable air chippers and grinders. A down-draft ventilating system removes air contaminants from the bench area to a second wet collector.

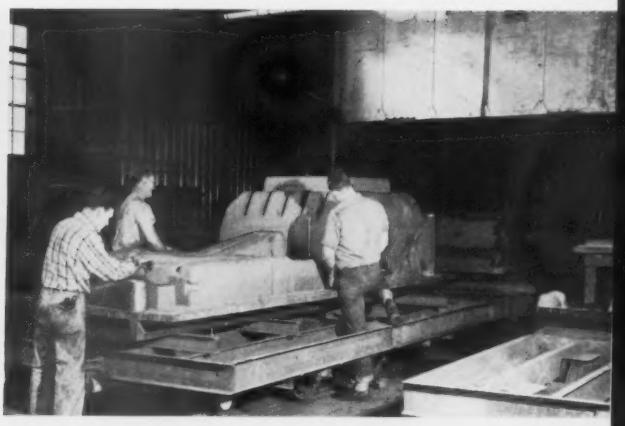
Iron Foundry Operations—All molding in the iron foundry is floor work, the follow board technique being employed to make molds. Molds are rammed by hand, with portable pneumatic rammers and on three jolt machines mounted in the floor. A bridge crane transports molds to and from the jolt machine. Since timbers must be laid on the largest jolt machine to accommodate the larger flasks, measuring up to 8 x 16-ft, a new 12 x 16-ft jolt machine has been ordered to accommodate the larger sizes. All molds are rammed in natural green sand and oven-dried at 400-450°F for periods up to 5 hr, depending on size.

Molds are faced with a mixture of equal parts of heap and silica sand plus pitch in the ratio of 1 to 30 parts sand and about 4 per cent western bentonite. Water averages 4 or 5 per cent but is not critical because molds are dried. Facing sand is mixed in a 750-lb capacity muller loaded by skip hoist. Heap sand is run through a portable vibrating screen before it is fed to the muller.

Prepared facing sand is emptied from the muller to boxes for movement by bridge crane to the molds. Molders ram the facing against the pattern. Backing sand, prepared on the floor, is picked up by the same crane with a clamshell bucket and dumped into the mold on top of the facing sand.

Flasks are made of cast iron segments bolted together. Each is gridded and many gaggers are

Cores range in weight from 1 to 6000 lb. Small ones are hand-rammed at several bench stations



Workers prepare large core for baking in one of five car-type ovens also used for drying molds

An overhead bridge crane handles ladles of molten iron for pouring large castings such as this air compressor frame

set to hold sand in place. All mold cavities are coated with a wash consisting of one part plumbago to three parts molasses water made up of two gallons of molasses to a barrel of water. The wash is applied by spraying and brushing.

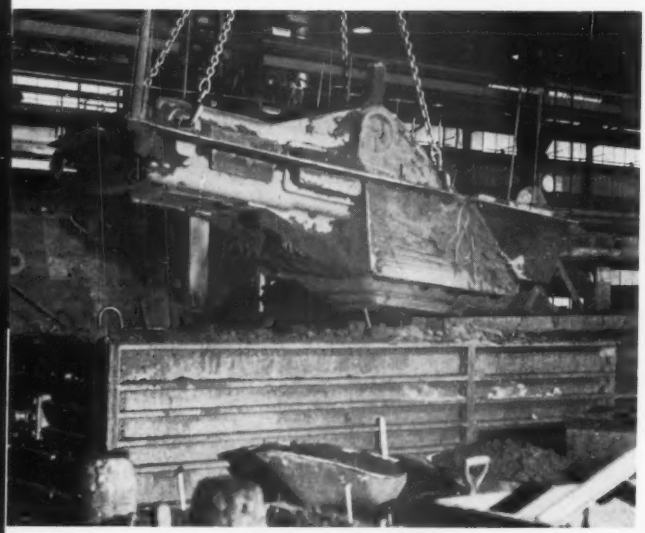
Molds are rammed during the day, oven-dried at night and poured the next day. Molding time varies, of course, with the size of the casting being made. In the case of a 6-ton mud pump casing, molding takes about 32 hr.

A bridge crane is used to break open molds and carry castings to a 10 x 14-ft shakeout. Dust is exhausted by a compensating air hood. The crane removes castings from the shakeout to the floor for removal of cores not dislodged by shakeout. Gates and risers also are removed here. Then the crane loads castings onto a rail car which is pulled by air motor and cable in and out of a 16 x 24 x 9-ft high walk-in type shot blast room. Smaller castings are transported directly from shakeout into the blast cleaning room.

Sand from shakeout falls to a vibrating feeder and passes under a magnetic separator to an oscillating pan conveyor. Sand is carried underground to a bucket elevator outside the building and raised to a hopper. Trucks receive sand from a gate under the hopper for transportation to a dump.

After shot blasting, castings are moved by bridge crane to any one of 12 booths for cleaning with air chippers and grinders. Down-draft systems exhaust air contaminants from each of the booths.

Melting—All iron is produced by the Sorbo-Mat process under the direction of one man. The cupola is lined by hand with monolithic material to 60 in. ID. Melting rate is 12 to 16 tons an hour. About 30 tons of metal is poured daily for about 2 hr starting at 2 p.m. Three types of iron are poured. The cupola charge for standard iron is



A large pump casting is removed from the mold by bridge crane which transports it to shakeout

600 lb steel scrap, 350 lb pig iron, 300 lb motor blocks and 250 lb returns. Coke charge for all irons is 260 lb with 80 lb limestone. The limestone is reduced as the heat goes along. Total carbon is 3.20-3.30 per cent, Mn 0.70-0.80 and Si 1.50-1.70. Tensile strength is 42,500 psi and hardness 200-241 bhn.

Iron for fluid cylinders contains 1050 lb steel scrap, 250 lb returns and 200 lb motor blocks. Total carbon is 2.90-3.10, Mn 0.80-1.00 and Si 1.50-1.70. Properties are 57,500 tensile and 200-250 bhn. Gear iron is made up of 1050 lb steel scrap, 250 lb motor blocks and 200 lb pig iron. The analysis is TC 2.90-3.10, Si 1.50-1.70, Ni 1.60-1.90, Mo 0.60-0.80 and Cr 0.11 residual. A test block for chemical analysis and a chill test wedge are poured from each ladle of metal. Chill depth runs between 5/32 and 7/32-in. In addition, a test bar is poured in the mold with each gear and fluid cylinder casting. Furthermore, a set of standards including photomicrographs has been developed for each iron. Standards are bound in book form and serve as a handy reference in daily control procedures.

Coremaking—Sand is delivered to the foundry on gondola or box cars and unloaded by clamshell bucket on a bridge crane or by portable conveyor to four storage bins of 100 tons capacity each. Workers wheel sand to mullers in hand buggies. A 750-lb capacity muller and a muller-type wheelbarrow are used for mixing sand formulations. The basic mix for brass and bronze castings consists of 180 lb silica sand, 18 lb Albany sand, 2 lb cereal, 1 lb oil and 3 qt water. For aluminum castings the mix is one part oil to 80 parts silica sand, ½ per cent clay and 3 per cent water. The mix for fluid cylinder pumps is one part oil to 60 parts of equal amounts of zircon and silica sand, 1 per cent cereal and 3 per cent water.

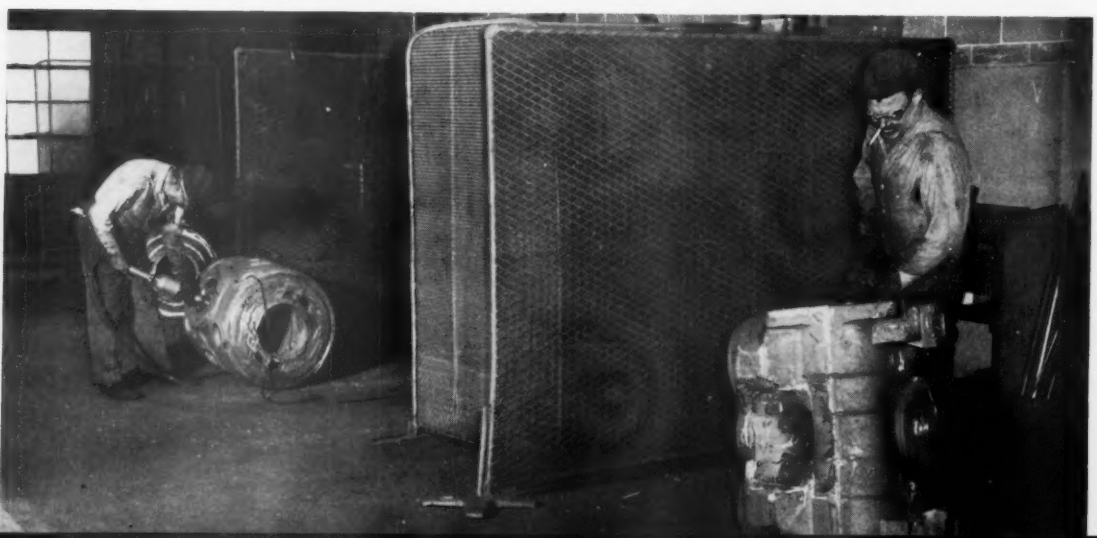
The iron foundry mix for cores weighing up to 1000 lb consists of 1500 lb Michigan City sand, 500 lb river sand, 2 per cent core oil and 1½ per cent cereal. The mix for large power frame cores is 2000 lb river sand, 500 lb Tennessee molding sand, 50 lb wheat flour and 1½ per cent cereal.

Cores range in weight from 1 to 6000 lb. They are hand-rammed on benches or on the floor, depending on size. Small cores are baked in three drawer or two rack ovens. Each is hooded and vented. Large cores are baked in five car-type ovens of 40,000-lb capacity each, equipped with combination gas or oil burners. Cars are moved in and out of these ovens by air motor and cable rigs. Iron foundry molds also are dried in these large ovens.

Company engineers have been experimenting with sodium silicate and air-set binders for cores. They expect that by the end of this year 25 per cent of core tonnage for iron and large brass castings will be in air-set-bonded sands. A small percentage of cores for aluminum and small brass and bronze castings will be in sodium-silicate-bonded sands.

A large, well-equipped pattern shop at this location makes patterns for the company's foundries located here and in La Grange, Mo.

Workers stationed in 12 booths equipped with down-draft exhaust systems use portable air tools to clean castings such as these air and water cylinders



By HARRY ST. JOHN
Foundry Consultant

Brass Casting Design... From the Foundry Viewpoint

The casting process offers versatility and economy, but good design is required to realize these advantages. Mr. St. John discusses this subject in the 24th article in his series on *The Brass Foundry*

WHEN a designer chooses to make use of castings, he does so because of the versatility and economy of the casting process. In no other way can molten metal be transformed into useful shapes in one operation. By no other method can the designer so inexpensively obtain the graceful form and attractive appearance he wishes to achieve in his product.

That the designer sometimes fails to take full advantage of these things is due to his lack of knowledge of foundry methods and of the foundry characteristics of the metals he specified. It is here that the foundryman can save himself trouble and be of considerable assistance to the designer if he is permitted to study the design and advise regarding it before its final adoption.

In selecting his alloy the engineer is likely to be guided by handbook information. There he will find data covering physical properties, resistance to different types of corrosion, etc. Other things being apparently equal, the designer will probably be influenced by the cost per pound of the available alloys, possibly selecting the cheapest without realizing that the saving can be lost because of foundry difficulties. The foundryman can point out these problems if given the opportunity.

Due to differences in fluidity and solidification characteristics, some alloys are more castable than

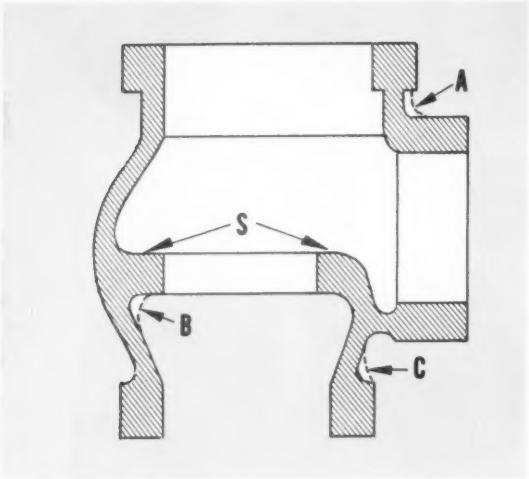


Fig. 1—Isolated heavy sections are difficult to feed. Adding a little metal at dotted lines A, B and C would save money in the foundry

others and can be employed at higher casting yields and with less rejection losses, particularly if the casting is of complicated shape. For certain applications a silicon brass or bronze may very well turn out to be cheaper than the less expensive manganese bronze. An experienced foundryman will seldom recommend a yellow brass for pressure work. Sometimes tradition or hidebound specifications stand in the way. For example, it is unfortunate that Navy G metal should be specified in cases where the more castable Navy M will serve as well.

The Cart or the Horse?—Sometimes it is hard to know whether to start with the cart or the horse. When functional requirements of the casting determine its basic design within close limits, the alloy should be chosen to fit the design. In other cases the design can be made to fit the most economical alloy or must be made to fit an alloy determined by rigid specification. The foundryman can advise how the casting must be gated and fed.

If castings are small, and several are made in the same mold, it is desirable to have a long pouring range so that as many molds as possible can be poured from each crucible or ladle. Taking the red brasses and bronzes as an example, an ideal design from the foundry point of view will provide a pouring range of about 150°F. With a well made, properly preheated ladle the temperature loss will be about 0.8°F per second, and if the acceptable top pouring temperature is precisely calculated and measured, usable castings can be poured during an elapsed time of 3 minutes.

If molds are poured at the rate of 8 seconds per mold, 22 or 23 molds can be poured without excessive scrap occurring at either the beginning or the end of the pour. This ideal is seldom approached. About the best we can hope for is a 2-minute pouring period and 15 molds per pour. If the casting is badly designed we may have as little as 40 seconds and run into trouble if we try to pour more than five molds from the one ladle.

Pouring Range Limitations—What features of design limit the pouring range? First of all, too thin a metal section. The red brasses and bronzes, if the metal is of good quality, will feed a considerable section as thin as 3/32 in. (0.094). Thinner sections will misrun and, if the metal is required to flow for more than about 3 in., $\frac{1}{8}$ in. (0.125) becomes the minimum. Obviously this requires good metal and perfect patterns and cores.

If we decrease the percentage of tin in the alloy, or increase the percentage of zinc, thicker sections are needed. For ornamental work the addition of a little aluminum to a yellow brass will so increase the fluidity that very thin sections can be poured, but this is not permissible in castings where leakage—even at gravity pressure—is involved.

Abrupt changes from a light to a heavy section are to be avoided, and fillets should be provided wherever two sections meet at an angle. If possible, the design should be free from any isolated heavy section which would be troublesome to feed. Fig. 1 illustrates a casting where this condition is difficult to avoid. The seat *S* has to be made heavier than any economical designer will make the walls of a low-pressure valve. In iron or steel he would not be so concerned, but brass is costly. The dotted lines at *A*, *B* and *C* show where the addition of a little metal will save money in the foundry.

In Fig. 2 the boss *B*, if designed to be solid, will have to be chilled. If many castings are to be made, the cost of the chills and the molding labor required to place them in the molds will greatly increase the cost of the castings. If it is planned to drill and tap a hole in the boss, it will be much better to incorporate a cored hole in the casting itself. This probably won't save much money in the machine shop but it will save a great deal in the foundry.

Core Shift Possible—Fig. 2 also illustrates another point. If a core is not adequately supported, it will shift position or float when metal enters the mold. Coring out the boss makes possible a third core support at this point. Unless this is done, the foundryman must do his best to prevent displacement of the core by using large block core prints as indicated at *P*. With a third support the smaller prints *C*, shown by the dotted lines, will provide much better insurance against core trouble.

A similar situation arises in larger castings where the weight of an unsupported core may cause it to sag. To prevent sagging an iron foundryman might use a chaplet, but the brass foundryman is denied this remedy by the fact that the temperature of molten brass is too low to melt completely a chaplet strong enough to support the core. The result is imperfect coalescence and a flaw in the casting wall. If the designer realizes this difference between iron and brass, the difficulty can usually be avoided. Sometimes money can be saved by coring an unneeded hole which is later plugged.

Every designer probably knows that he must al-

low some draft on certain surfaces of his casting to permit withdrawing the pattern without breaking the mold. To determine amount of draft he needs to know how the casting is to be placed in the mold. A hollow cylinder, for example, might be poured on end or on its side. To be sure, it is the patternmaker's responsibility to see that this is done but unnecessary machining can sometimes be avoided if the casting is designed with this thought in mind. On occasion the use of a baked core can be eliminated by increasing the draft to a point where the pattern will draw from a green sand core forming part of the mold.

Less Finish Desirable—As a rule the design engineer is more familiar with machine shop problems than he is with those of the foundry. The machinist doesn't want to cut away any more metal than he has to, but he does want to be sure of enough finish to insure that the casting will "clean up." In the past the foundryman has often encouraged an increase in finish with the idea that surface defects would be machined away. The present trend is toward castings so true to shape and close to dimension that less finish is required.

In some cases a machine finish formerly specified only for the sake of appearance has been abandoned. Where pressure tightness is involved, this is a considerable improvement. When the red brasses and bronzes solidify, they form a dense skin, an eighth of an inch or more in depth, on their outer surfaces. If this skin is cut away, the remaining metal is of much more open structure, weaker and more likely to leak under pressure. Whenever possible the dense, close-grained skin should be retained. The designer should also have this circumstance in mind when he thickens a section for increased strength. The increased thickness may not add as much to the strength as he expects unless he specifies the addition of a grain refining element such as nickel.

It is a part of the patternmaker's job to allow for the shrinkage which will cause the casting to be smaller than the pattern. This shrinkage differs for different metals; knowledge of these differences is part of the patternmaker's training. With respect to any particular dimension, however, shrinkage sometimes does not follow the rule. It may be more than expected or it may be practically nothing. Whenever a variation of this kind would affect the design, the only safe course is to make sample castings before the design is "locked up." In any case this is good practice if a large number of castings is to be made.

It has been the purpose of this article to emphasize the importance of co-operation and mutual consultation between designer and foundryman before the final adoption of casting design. In addition to details of design, it is useful for the foundryman to know how the casting is to be machined and the conditions under which it is expected to function.

Must Understand Blueprints—To some extent the advantages of consultation will be lost if the foundryman is unable to tell by looking at a blueprint what the casting will be like. The ability to read blueprints is almost as important to the foundryman as it is to the machinist. Even when the designer has done his best to co-operate, it too often happens that the foundryman approves a design only to discover later that the casting involves problems he had not foreseen. When sample castings are available this difficulty can be avoided.

All concerned have much to gain if, by the observance of these principles, castings can be made to fit their purpose more effectively and at less cost.

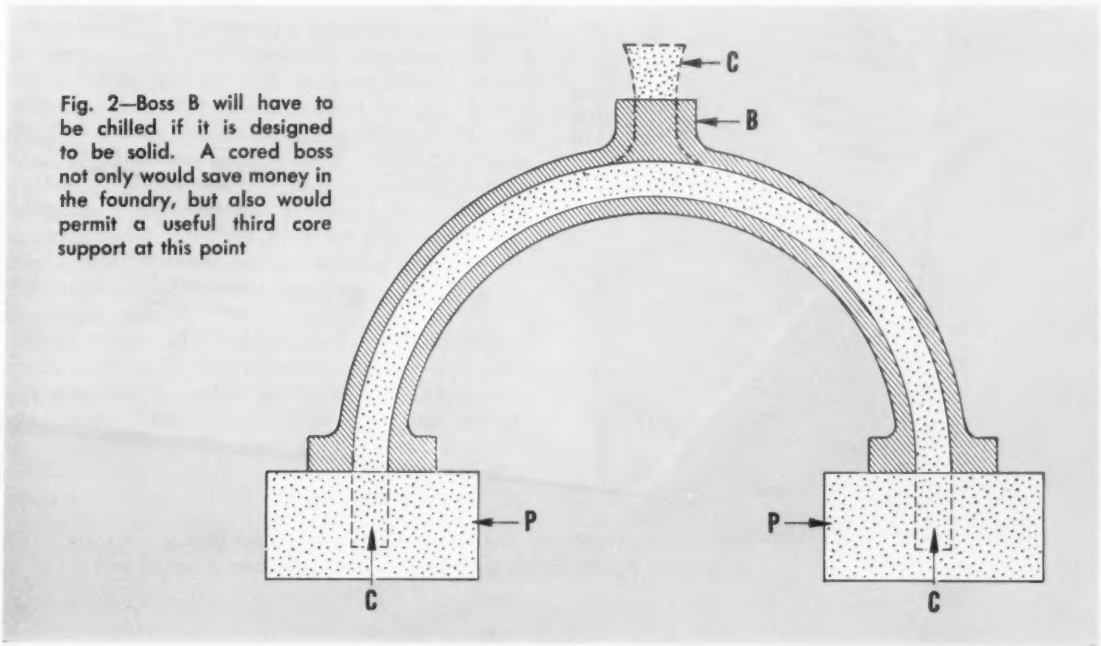


Fig. 2—Boss B will have to be chilled if it is designed to be solid. A cored boss not only would save money in the foundry, but also would permit a useful third core support at this point

Exhibit "G"

ESTIMATE SHEET or JOB COST RECORD

Date

NOTE: DEPARTMENTAL RATES USED IN THIS ESTIMATE WERE TAKEN FROM PAGE 34.

Company "B" Company | Part No. 60825 | Quantity 2000 | Wgt. Per Mold 6

Pattern Equipment Matchplate | Pcs. Per Mold 8 | Wgt. Each .75 | Cores Per Casting 1

Core Equipment Aluminum corebox | Cores Per Box 4 - Blower

Metal Specified SAE 65 | Tests Req'd. Chemical Analysis & Physical Test

DELIVERY REQUIREMENTS

Releases	Delivery Date
1000	Feb. 1
1000	Mar. 1
via truck	

METAL COST

	Percentage	Cost	Total Cost
Analysis			
Copper			
Tin			
Lead			
Zinc			
Ingot 88-10-2	100%	.3800	.3800
Deoxidizers			
Total			.3800
Plus 6 % Metal Loss & Shrinkage			.0228
Total Metal Cost			.4028

MOLDING PRODUCTION DETAIL

80 molds per days
Estimated scrap 10%

CORE PRODUCTION DETAIL

40 boxes, or 160 cores per hr.
640 ÷ 160 = 4. hrs.
Plus 5% breakage .2 hrs.
Total 4.2 hrs.

CLNG. & SHIP. PROD. DETAIL

Remove gates, grind, clean and inspect 200 per hr.
640 ÷ 200 = 3.2 hrs.

ADDITIONAL OPERATIONS

Laboratary Costs per heat of 240 lbs. of castings. $14.40 or $.06 per lb.

DIRECT LABOR & OVERHEAD

Department	Total	Units	Rate	Estimate	Actual
Melting: – Combined Rate	480	Lbs.	.0619	29.71	
Molding Direct Labor	8	Hrs.	2.00		
Molding Overhead		Hrs.	3.66		
Combined Rate	8	Hrs.	5.66	45.28	
Core Direct Labor	4.2	Hrs.	2.00		
Core Overhead		Hrs.	2.75		
Combined Rate	4.2	Hrs.	4.75	19.95	
Clng. & Ship. Direct Labor	3.2	Hrs.	1.60		
Clng. & Ship. Overhead		Hrs.	3.08		
Combined Rate	3.2	Hrs.	4.68	14.98	
Other Operations: –					
Heat Treating		Lbs.			
Impregnating		Lbs.			
Laboratory	480	Lbs.	.06	28.80	
Total Direct Labor & Overhead				138.72	
Cost Per Pound				.2890	
Scrap Allowance 10 %				.0289	
Total Conversion Cost				.3179	
Plus Metal Cost Per Pound				.4028	
Mfg. Cost Per Pound				.7207	
Profit %					
Selling Price Per Pound					
Selling Price Each (Wgt. ea. x S. Price)					
Additional Expense					
Machining – Each				.10	
Total					

COST OF PATTERNS, MACHINING, ETC.
(Include Outside Purchases)

Machining cost each plus Handling Cost & Profit $ .10

New Pattern equipment plus Handling & Profit $285.00
Quote separately

Fig. 1—Sample estimate sheet illustrates how budgeted costing rates are to be used. Figures shown are based on production over a period of 8 hr

Budgeting For Profit

In the Nonferrous Foundry

Budgetary control is an important tool of management. This article covers the setting up of such control, use of the budget for pricing castings and effect of volume on cost

By URBAN F. von ROSEN
Soloway & von Rosen
Cleveland

BUDGETARY control has been defined in many different ways but all definitions emphasize two points: (1) It is a complete financial plan and (2) It is a means of control.

Here's the definition I like best: A budget is a complete financial plan and is, at the same time, a means of so controlling the activities of a business that the plan can be accomplished. The complete co-ordinated plan is called the master budget. It is usually prepared to cover a minimum period of three months and a maximum period of a year. It includes a projected statement of net income—usually called the operating budget—a projected statement of cash receipts and disbursements, and a projected balance sheet as at the close of the budget period.

The cash budget is important. The credit departments of most commercial banks are more impressed by the ability of a prospective borrower to project accurately his cash requirements, as evidenced by careful cash budgets over a period of years, than they are impressed by the balance sheet or income statement. The projected balance sheet is important because only by carefully controlling additions to plant and equipment and by adopting a conservative dividend policy can the business avoid depletion of its working capital. In this article, however, we are most concerned with the projected income statement which we term the Operating Budget.

The Value of Budgeting—Two fundamental truths make budgeting valuable. The average person does not have the power to see clearly into the future. But if we reduce to writing and attempt to co-ordinate those conditions and events which we believe will occur during the next calendar quarter, we can see much more clearly into the future than otherwise would be possible.

The second truth is that members of an organization will work more efficiently and more willingly toward an objective if they know what that objective is. This is particularly true if each member has had a part in setting the goals to be reached. For this reason budget standards should be determined by the foreman of each department, subject to review and approval progressively by upper levels of management.

Also, there are two basic prerequisites for the installation of budgetary control. One deals with

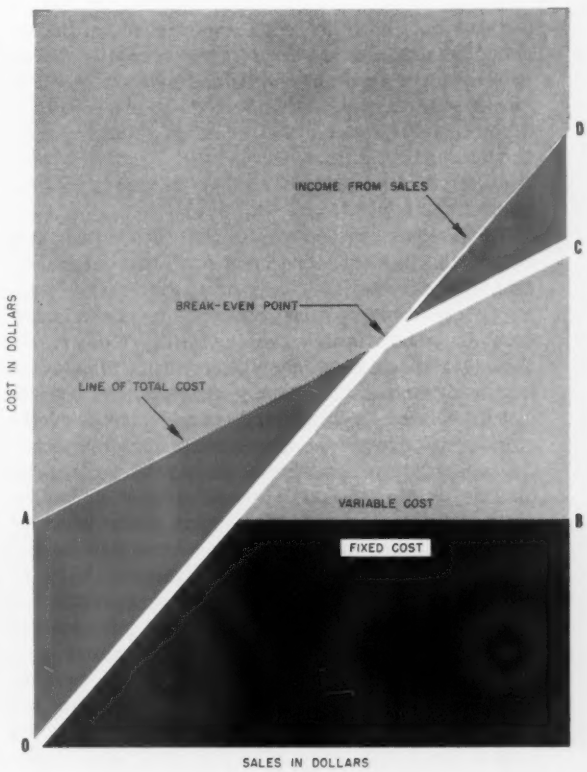


Fig. 2—Relationship is shown between fixed and variable costs, sales and the break-even point

THE NON-FERROUS FOUNDRY COMPANY

MELTING DEPARTMENT - ESTIMATED COMBINED RATE

FIRST QUARTER - 1957

Direct Department Burden		
Melting Labor - 2,000 Hours @ $2.25		$ 4,500
Share of Superintendence - Schedule 1		185
Supplies and Expense:		
Crucibles	$1,375	
Gas - Schedule 2	1,455	
Other Supplies	725	3,555
Total Direct Departmental Burden		8,240
Variable Foundry Overhead - Schedule 3		
Payroll Insurance and Taxes	422	
Power and Light	192	614
Total Burden and Variable Overhead		8,854
Fixed Foundry Overhead		
Building Expense - Schedule 4	396	
Equipment Expense - Schedule 5	1,500	1,896
Total Conversion Cost		$10,750

Estimated Annual Units - Good Castings Produced

		Units
Aluminum Base Alloy	45,000 Pounds x 2	90,000
Copper Base Alloy	265,000 Pounds	265,000
		355,000

Total Conversion Cost divided by Units of Goods Castings Produced equals $10,750 divided by 355,000 equals $.0302817.

For Aluminum Base Alloy - Use $6.06 Per Cwt.

For Copper Base Alloy - Use $3.03 Per Cwt.

Based on Weight of Finished Casting

Fig. 3—Method that is used to compute costing rate per unit for a foundry melting department

records and the other with organization. Before a budget program is started, care should be taken to see that a good chart of accounts is in use, and also that the accounting and production records are designed to produce the necessary information. In this connection the cost manual published by the Non-Ferrous Founders' Society in 1954 will be helpful.

The second prerequisite is that the duties and responsibilities of each member of the organization be clearly defined. Measures that characterize budgetary control consist of a study of variances from budgeted figures and the ability to attribute these variances, good or bad, to specific individuals in the organization. Many management devices closely related to budgetary control include piecework rates, wage incentive plans, predetermined departmental rates, standard costs, pricing formulas and many others. The use of any of these devices constitutes a starting point from which a complete system of budgetary control can be developed.

Setting Up the Budget—Budget preparation usually starts with an estimate of sales for the budget period. Here sales representatives should participate. Their views should be related to general business conditions and also to the standard plant capacity. The total estimates should be broken down into sales of copper-base and aluminum-base alloy castings, machine shop sales, patterns and other products. While sales estimates usually are made in dollars, this is not too reliable a starting point for the nonferrous foundry because: 1. The sales dollars will be influenced considerably by a fluctuating metal market. 2. The relative proportions of aluminum-base castings and copper-base castings also will affect the tonnage and dollars of sales. 3. The relative proportions of light and heavy work will affect both tonnage and dollar volume.

The sales return on conversion cost is a more dependable and more constant starting point. Actually, estimated direct labor hours in the molding department are the base from which other details of the budget should be developed. Based on work spaces and machines available, the maximum capacity in direct labor hours can be determined for each department. In foundries 75 per cent of this normal capacity may be established as standard capacity for the purpose of budgeting operations. Twenty per cent should be deducted from this figure for contingencies such as production delays, breakdowns, absenteeism and other lost time factors. Using this method, operations would be budgeted at 60 per cent of maximum capacity. To base prices on a lower volume would drive business away. To base prices on a higher volume during good times would have the effect of giving away part of the potential profit.

Once estimated conversion sales have been coordinated with estimated direct labor hours in each department, bases must be established to estimate average metal loss and shrinkage, melting cost and average scrap allowance. One of the most important factors in the determination of profits is productivity or operating efficiency. The difficulty lies in measuring this factor. If the budget

THE NON-FERROUS FOUNDRY COMPANY

MOLDING DEPARTMENT - ESTIMATED COMBINED RATE

FIRST QUARTER - 1957

Direct Labor - 4,875 Hours @ $2.60		$12,675
Direct Department Burden		
Indirect Labor - 2,775 Hours @ $2.00		$ 5,550
Share of Superintendence - Schedule 1		752
Supplies and Expense		1,425
Total Direct Departmental Burden		7,727
Variable Foundry Overhead - Schedule 3		
Payroll Insurance and Taxes	$1,719	
Power and Light	287	2,006
Total Burden and Variable Overhead		9,733
Fixed Foundry Overhead		
Building Expense - Schedule 4	905	
Equipment Expense - Schedule 5	378	1,283
Total Burden and Overhead		11,016
Total Conversion Cost		$23,691

Total Conversion Cost divided by Direct Labor Hours equals $23,691 divided by 4,875 equals $4.8597.

Use $4.86 per direct labor hour

Fig. 4—How costing rate per direct labor hour is figured for molding. Similar methods apply to cores, cleaning, shipping and machine shop

is based on conversion sales and if a constant relationship of light and heavy work over a short period of time is assumed, a fairly accurate measure of productivity can be developed by use of certain units. Since most nonferrous foundries produce both brass and aluminum castings, a unit for each department that represents equal cost for copper-base alloy and aluminum-base alloy must be established.

Figuring Melting Cost—The productivity factor in the melting department is units melted per melting labor hour. In the Cleveland area we use a unit which equals 1 lb of copper-base alloy or ½ lb of aluminum-base alloy. This is equivalent to saying that we believe the cost of melting 1 lb of aluminum is twice that of melting 1 lb of brass when pour-off is included in melting department costs.

Of course, the most accurate method of determining the cost of melting aluminum-base alloy and copper-base alloy is to segregate these costs on your books. Some foundries do this by having separate departments for copper-base alloy and aluminum-base alloy castings. In using the method suggested, budgeted pounds of aluminum castings sales are multiplied by two, budgeted pounds of brass castings sales are added and the result is units of finished good castings for which sufficient metal must be melted.

Here the question of yield enters the calculation. Because of gates, risers and melting losses, about 150 lb of metal usually must be melted to obtain 100 lb of good castings. The melting productivity factor can be expressed either in units of total metal melted or in units of good castings produced. The factor will be 50 per cent higher on the basis of the finished weight of good castings than it will on the basis of total metal melted. However, assume that the productivity factor is based on the pounds of good castings produced. Also assume that from past experience and conditions prevailing during the budget period, we estimate one hour of melting labor to melt and prepare for pouring sufficient metal to produce 150 units of finished castings. Dividing units of good castings to be produced by 150 will determine the hours of melting labor required to melt sufficient metal to produce these finished castings.

Other Department Costs—In the molding department a unit that takes into account the relative weights of equal volumes of the two metals is used. The same mold used for a 3-lb brass casting could be used for a 1-lb aluminum casting. So here the unit is 1 lb of copper-base alloy and 1/3 lb aluminum-base alloy. The productivity factor is units of good castings produced per direct labor hour for molding. This factor is extremely important and is one of the most significant if not the most significant index to the success or failure of foundry operations.

In the cleaning and shipping department a unit that equals 1 lb of copper-base alloy or ½ lb of aluminum-base alloy is used. The estimate of direct labor hours in the coreroom is not quite so clean cut. If the same percentage of past core work is anticipated in the future, the percentage of direct labor hours in the coreroom to direct labor hours in the molding department will serve to establish coreroom direct labor hours for the budget period. The percentage of indirect labor to direct labor is a valuable index. It should be calculated for each department each month and compared with the budgeted standard or with previous experience. The estimate of departmental supplies and expense must be added to the cost of direct and indirect labor.

THE NON-FERROUS FOUNDRY COMPANY

FIRST QUARTER 1957 - BUDGET - VARIABLE OVERHEAD

Payroll Insurance and Taxes	
Vacation Pay	$1,250
Workmen's Compensation	1,250
Federal Old Age Taxes	1,000
Unemployment Taxes	625
Water	16
	$4,141
Power and Light	$1,200

Apportionment

Payroll Insurance and Taxes

	Combined Direct and Indirect Labor *	% of Total	Amount
Melting - Exhibit A	$ 4,500	10.2	$ 422
Molding - Exhibit B	18,225	41.5	1,719
Core - Exhibit C	5,500	12.5	518
Cleaning and Shipping - Exhibit D	10,688	24.3	1,006
Machine Shop - Exhibit E	5,000	11.5	476
	$43,913	100.0	$4,141

Power and Light

	Estimated Consumption % of Total	Amount
Melting - Exhibit A	16.0	$ 192
Molding - Exhibit B	23.9	287
Core - Exhibit C	7.0	84
Cleaning and Shipping - Exhibit D	31.6	379
Machine Shop - Exhibit E	21.5	258
	100.0	$1,200

* Exclusive of superintendence

Fig. 5—How the several components of variable overhead are apportioned over the departments

Using the Budget for Pricing—All business needs a sound pricing policy. The need is greatest, however, in those industries where sales are obtained by submitting quotations in competition with others. A sale obtained by submitting a quotation that is too low because the bidder is ignorant of his costs is a loss to the entire industry. In this industry where members are selling castings of different alloys and where costs vary greatly because of complexities of molding, coremaking, and cleaning, true costs can be determined only if the cost characteristics of a particular casting are considered carefully and direct labor hours in each producing department are costed accurately.

To illustrate, the percentage of metal loss and shrinkage in producing copper-base alloy castings varies considerably. Furthermore, the percentage

THE NON-FERROUS FOUNDRY COMPANY

FIRST QUARTER 1957 - BUDGET - BUILDING EXPENSE

Maintenance of Building	$ 948
Depreciation of Building	312
Real Property Taxes	143
Fire and General Insurance	237
A.D.T. Service	173
Gas - For Heat - Schedule 2	150
Total Estimated Building Expense	$1,963

Apportionment

	% Floor Space Used	Amount
Melting - Exhibit A	20.2	$ 396
Molding - Exhibit B	46.1	905
Core - Exhibit C	11.1	218
Cleaning and Shipping - Exhibit D	11.5	226
Machine Shop - Exhibit E	11.1	218
	100.0	$1,963

Fig. 6—The fixed overhead item of building expense is distributed on a square footage basis

of metal loss and shrinkage in producing copper-base alloy castings generally is greater than the percentage of loss in producing aluminum-base castings. The important point is that each alloy has different characteristics that affect cost, and these must be taken into consideration. Due to differences in indirect labor, supplies, power and other factors, the cost per direct labor hour may be much higher in one department than in another. Additions to machinery and equipment increase the depreciation, insurance and property taxes in the department in which they are installed. Consequently, accurate conversion costs for foundries can be determined only by considering each department individually. It has been shown how variable costs that can be charged direct to each producing department should be budgeted.

Consider Overhead Costs—The Non-Ferrous Founders' Society cost manual divides overhead into two groups—variable overhead and fixed overhead. Variable overhead includes payroll taxes and payroll insurance and power and light. Payroll insurance and payroll taxes naturally are distributed to the producing departments on the basis of payroll. Power and light are distributed on the basis of the rated horsepower of motors and the wattage of lamp bulbs multiplied by the average hours in operation.

Fixed overhead consists of building expense and equipment expense. Building expense includes rent or building depreciation, and insurance, real estate taxes and similar items and is distributed to the producing departments on the basis of square feet of floor space. Equipment expense includes depreciation, insurance and taxes on equipment and is distributed to the producing departments on the basis of equipment valuation.

A budgeted costing rate per direct labor hour can be determined by dividing the total dollars of budgeted conversion cost in each department by the budgeted hours of direct labor. This rate combines direct labor, direct department burden and the apportioned overhead—in short, the total conversion cost per direct labor hour. Since we are at the moment concerned with pricing, let us see how these rates are used.

How the Costing Rate Is Used—The estimate sheet shown in Fig. 1 is reproduced from *Basic Cost Principles for Non-Ferrous Foundries*, a book published in 1954 by the Non-Ferrous Founders' Society national cost committee. It illustrates how the budgeted costing rates should be used. The figures shown are based on 8 hr of production. Melting cost is calculated on the basis of units of good copper-base alloy castings produced. Total conversion cost for molding, coremaking, cleaning and shipping is figured on the basis of a budgeted costing rate per direct labor hour. The rates per direct labor hour used include a share of selling and administrative expense. Attention is directed to this fact because later illustrations will show selling and administrative costs separately.

The example shows a total of $138.72 for 8 hr of production. This amount divided by pounds of good castings produced gives the cost per pound. To this is added the scrap allowance to arrive at the total conversion cost per pound. By adding metal cost, which always should be figured at prevailing market prices, total manufacturing cost is obtained. Note particularly that the metal cost includes a provision for metal loss and shrinkage. Note also the use of productivity factors, 10 molds per direct labor hour and 160 cores per direct labor hour.

A carefully prepared budget will develop accurate averages for metal loss and productivity. A budget is a good overall guide but is not a substitute for good judgment. When the yield is expected to be low a somewhat higher rate for melting should be used. Even in different analyses of copper-base alloy the percentage of metal loss may be greater or less than the budgeted average due to greater or less loss in oxidation and cleaning. Certainly in individual jobs the productivity factors will vary considerably. Notwithstanding all of this, the budgeted average warns the estimator that a deviation from this average must be supported by the demonstrable peculiarities of a particular job.

Effect of Volume on Cost—The level of sales and production established in the operating budget affects the pricing policy. Certain costs vary in total dollars almost directly in proportion to volume. The cost of metal and the cost of direct labor, exclusive of overtime premium, are examples. This is particularly true of direct labor if the men are on a piecework basis. Certain types of indirect labor and supplies are also variable with production. In contrast are expenses that are not affected by volume, such as rent, real estate taxes, fire insurance, depreciation as usually computed on buildings and equipment, and the salaries of

THE NON-FERROUS FOUNDRY COMPANY

FIRST QUARTER 1957 - BUDGET - EQUIPMENT EXPENSE

Maintenance of Furnaces	$1,500
Maintenance - Machinery and Equipment	$ 875
Depreciation - Machinery and Equipment	700
Personal Property Taxes	225
	$1,800

Apportionment

	Equipment Value * % of Total	Amount	Maintenance of Furnaces	Total
Melting - Exhibit A			$1,500	$1,500
Molding - Exhibit B	21.0	$ 378		378
Core - Exhibit C	9.2	166		166
Cleaning and Shipping - Exhibit D	42.2	760		760
Machine Shop - Exhibit E	27.6	496		496
	100.0	$1,800	$1,500	$3,300

* Exclusive of furnaces

Fig. 7—The fixed overhead item of equipment expense is spread on the basis of equipment value

general manager, superintendent and some others.

For practical purposes and within reasonable limits, total cost for a given period is equal to total dollars of fixed expenses plus variable costs expressed as a percentage of total manufacturing cost or of sales. Any foundryman can approximate his fixed costs by comparing the sales and total costs of two periods, one of high sales and production and the other of low sales and production.

Say in March, 1956, the foundry had sales of $80,000 and total costs of $70,000, thus realizing a profit of $10,000. In July, 1956, the foundry had sales of $20,000 and total costs of $22,000 suffering a loss of $2000. The difference between the costs in the two months would, of course, consist entirely of variable costs. The difference in total costs for the two months is $48,000 and the difference in sales is $60,000. We therefore can conclude that variable costs are 80 per cent of sales. Subtracting 80 per cent of the sales for each month from the total costs we calculate that the fixed expenses are $6000 a month. Assuming that there is nothing unusual in the expenses of either month, during a period that prices are reasonably stable and there are no big additions to fixed assets or changes in executive salaries, total monthly costs will equal $6000 plus 80 per cent of sales.

Using the same illustration, 20 per cent, or what remains out of each sales dollar, is often called the contribution margin. It is also known as the Profit/Volume Ratio. It is called the contribution margin because it contributes first to the payment of fixed costs and after paying those costs, contributes to the accumulation of profits. In our illustration, since there are 20 cents left out of every sales dollar after paying for variable costs, it is evident that it will take $30,000 in sales each month to cover fixed costs. This sales level of $30,000 is known as the "break-even" point, since at this sales level the foundry neither makes a profit nor suffers a loss. At monthly sales volumes of less than $30,000 the foundry will lose money at the rate of 20 cents for every dollar by which the sales fall short of $30,000. At monthly sales volumes of more than $30,000 the foundry will realize a profit of 20 cents for every dollar by which the sales exceed $30,000. Putting these figures on an annual basis, the annual fixed charges would be $72,000 and the "break-even" point would be $360,000 of sales.

The capital employed in the business is $140,000 and a rate of return of 10 per cent after taxes is considered fair. If operating as a corporation, the foundry must then earn $20,000 before federal income taxes of 30 per cent in order to realize a return of 10 per cent on the capital invested. Since it has a contribution margin of 20 per cent, to earn this amount it must have a sales volume of $100,000 in excess of its "break-even" sales of $360,000. The total required annual sales volume of $460,000 can be termed "normal." In any discussion of predetermined costs or budgets, the word "normal" arouses much skepticism, yet there is certainly nothing profound about the calculation we have just made, nor is there anything vague or speculative about setting a "normal" volume at a level which is at least high enough to cover all costs and produce a fair rate of return on capital. If a foundry is exceptionally efficient and business conditions are right, "normal" might be set much higher than this level, but it should rarely if ever be set at a lower level.

Fig. 2 illustrates the relationship between fixed and variable costs, sales and the break-even point. The vertical axis of this chart represents cost in dollars. The horizontal axis may be units or sales

THE NON-FERROUS FOUNDRY COMPANY

FIRST QUARTER 1957 - BUDGET - ADMINISTRATIVE EXPENSE

Salaries - Office and Administration	$ 7,500
Stationery and Supplies	400
Depreciation - Office Furniture and Fixtures	63
Postage	250
Dues and Subscriptions	162
Company Car Expense (Includes $165 Depreciation)	415
Bad Accounts	50
Charitable Contributions	500
Professional Services	450
Telephone and Telegraph	325
Domestic Franchise Tax	38
Life Insurance	500
Christmas Expense	500
Office Rent	330
Estimated Total	$11,483

Total Estimated Administrative Expense divided by Total Estimated Manufacturing Cost equals $11,483 divided by $158,705 equals 7.235437%.

Use 7.3% of Total Manufacturing Cost

Fig. 8—The budget rate for administrative expense is the percentage of total expense to total estimated manufacturing cost for the period

in dollars. The line *AB* represents fixed costs which do not vary with sales and is therefore drawn parallel with the horizontal axis. The line *AC* is plotted to show variable costs in reference to the line *AB*. It is evident then that the line *AC* represents total costs in reference to the horizontal axis since it is the sum of both fixed and variable costs. The line *OD* from the origin *O* shows sales in dollars. Where this line intersects the line *AC* is the break-even point which can then be read from the horizontal scale to determine the sales in units or dollars at which neither a profit is made nor a loss sustained. It is an easy chart to prepare and acquaints management with one of the most important constants of the business.

Variable Budgets—A flexible budget is one that shows estimated expenses for different levels of operation both above and below standard, usually at 5 per cent intervals. This is used to establish what the expense should be at the volume actually operated. By using this figure as a division point between actual expense and expense applied at the budgeted rate the total variance can be analyzed into a controllable or budget variance and a non-controllable or volume variance.

Other Aspects of Budgeting—First, one learns much about one's own business when he attempts to prepare a budget. This education alone is worth the effort. Second, in many small businesses a budget often gives a clearer picture of the operations than that obtained from the monthly income statements. In many small companies depreciation is recorded and prepaid and accrued items adjusted only at the end of the year. Third, certain expenses which are contingent to a degree on annual profits, should properly be excluded in establishing costing rates. Annual bonuses and year-end additions to executive salaries are items of this nature. These are really distributions of profits and are not items properly includable in costing rates. Fourth, a budget can be used to determine differential costing rates which are expensive to develop by routine accounting methods. Differential costs of metal losses and melting costs for different alloys are illustrations of this.

Illustration of Budgeted Costing Rates—Figs. 3 through 9 are excerpts from a report recently prepared by our firm. All means of identifying the particular foundry have been removed. The company operates five departments, the usual four foundry departments and the machine shop. Fig. 3, Melting Department, illustrates the method of computing a costing rate per unit for this department. Included in the total conversion cost of $10,750 for the first quarter of 1957 are the usual items of direct departmental burden, together with a proration of variable and fixed overhead. Production of this department has been measured in units equal to 1 lb of copper-base alloy or ½-lb of aluminum-base alloy. By dividing the total conversion cost by the total units we arrive at a unit cost of $3.03 per 100 units which means $3.03 per 100 pounds for copper-base alloy and $6.06 per 100 pounds for aluminum-base alloy. These rates are not necessarily typical. They apply only to one particular foundry based on its production methods, equipment and type of castings produced.

Fig. 4, Molding Department, shows how the rate per direct labor hour is computed for molding. These two statements in our report are followed by similar statements for the coreroom, for cleaning and shipping, and for the machine shop. The complete report also contained seven statements indicating how various expenses were apportioned. Illustrative of this apportionment is Fig. 5, showing how variable overhead is spread over the departments, payroll insurance and taxes being spread on the basis of combined direct and indirect labor and power and light being spread on a percentage basis which was determined by the probable kilowatt hours to be used. Fig. 6 indicates how the building expense, a part of the fixed overhead, is distributed. In this case you will note it is based on the number of square feet of floor space involved. Fig. 7 covers the remaining part of fixed overhead, indicating how the equipment expense, consisting of maintenance, depreciation and property taxes, is spread on the basis of equipment value. Fig. 8 budgets the quarterly administrative expense which is shown in detail. The percentage of total expense to total estimated manufacturing cost for the period is slightly less than 7.3 per cent which is the budgeted rate to be used. Finally, Fig. 9 illustrates the complete operating budget for the quarter. All of the other statements are cross-indexed and tied into this summary. This particular foundry is budgeting a net operating profit equal to 10 per cent of its net sales.

THE NON-FERROUS FOUNDRY COMPANY

FIRST QUARTER 1957 - OPERATING BUDGET

				Percentage of Sales
Net Sales				
Copper Base Alloy		$145,000		
Semi-Finished Bronze Bar Stock		23,000		
Aluminum Base Alloy		32,000		
Total Net Sales			$200,000	100.0
Cost of Sales				
Net Cost of Metal Consumed		92,000		46.0
Direct Labor - Appendix B		33,863		16.9
Indirect Labor - Appendix B		11,863		5.9
Supplies and Expense		10,375		5.2
Variable Overhead - Schedule 3:				
Payroll Insurance and Taxes	$4,141			
Power and Light	1,200	5,341		2.7
Total Variable Manufacturing Costs		153,442		76.7
Fixed Overhead:				
Building Expense - Schedule 4	1,963			
Equipment Expense - Schedule 5	3,300	5,263		2.7
Total Manufacturing Cost of Sales			158,705	79.4
Gross Profit			41,295	20.6
Operating Expenses				
Administrative Expense - Schedule 6		11,483		
Selling Expense - Schedule 7		9,750	21,233	10.6
Net Operating Profit			$ 20,062	10.0

Fig. 9—All budgeted cost items are summarized in this complete quarterly operating budget

Editors' Note: This article is based on a paper presented by Mr. von Rosen at the Wisconsin Regional Foundry Conference in Milwaukee Feb. 14-15.

Influence of the Carbon-Silicon Ratio on

Graphitization of Malleable Iron

Study has shown that a functional relationship exists between the carbon-to-silicon ratio and the time required for decomposition of cementite, provided that the manganese-to-sulphur relationship is satisfactory

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MALLEABLE iron is produced from white iron by a lengthy thermal process at high temperatures. White iron as a rule contains carbon and silicon in a smaller percentage than gray iron and therefore does not undergo graphitization during the casting process itself. Of course, the casting also has to be chilled in order to prevent graphitization.

Cupola production of white iron suitable for blackheart (or American-type) malleable iron is extremely difficult, in view of the difficulties of close chemical control. Most foundries use auxiliary furnaces (such as air or arc furnaces) for the actual alloying and adjusting of conditions (temperature, etc.). The cupola then is used only to provide the raw material.

Chilled white iron consists of phases determined by the ordinary Fe:Fe_3C diagram for irons containing between 2 and 3 per cent carbon. The structural components are, as is well known, cementite and pearlite. During solidification of the iron, there is a tendency to graphitize—or, more correctly, the cementite tends to break down—according to the following equation:

$$Fe_3 \rightarrow 3Fe + C \text{ (graphite)}.$$

This reaction can be suppressed by a sharp drop of temperature during the casting process.

Achieving Graphitization—In practice, graphitization is achieved by reheating the cast iron to a bright red glow, maintaining the temperature for some time to allow the reaction to be completed, then slowly cooling it. Such treatment changes the structure of the iron completely. The matrix in which the temper carbon is embedded consists of ferrite, with silicon, manganese, phosphorus and other alloying elements in solid solution.

The Thermal Process—The thermal process in which the reaction takes place is as follows: The iron is heated to 950°C and the temperature maintained for a certain period of time. It then is cooled to 710°C for another definite period and finally is cooled to room temperature. In the course of the various stages of the thermal treatment, a number of reactions take place.

In the first stage, at 950°C, cementite is transformed into austenite. The result is a solid solution of carbon in austenite according to the Fe:Fe_3C diagram. Excess carbon is eliminated according to the equation set forth earlier. The period of time for which that high temperature is maintained should be sufficient to obtain the above equilibrium. A longer period would be useless since all changes at that temperature already will have taken place.

At the conclusion of this stage, the temperature may be decreased slowly. Any change in temperature will alter the equilibrium conditions. It is essential to lower the temperature slowly so as to permit the complete separation of the graphite according to equilibrium requirements. Special care should be taken to maintain a slow rate of cooling at the eutectoid temperature, to enable the pearlite to decompose as it is formed.

The temperature in the second stage is 710°C. This temperature is too low for a rapid decomposition of the pearlite. The slowness of the reaction at such low temperature is the reason that, in the second stage, it takes longer to complete the reaction than in the first stage, where the cementite decomposes at a higher temperature. The experimental ratio of durations for the two stages is 1:3. taking into account that at the higher

temperature most of the carbon will graphitize, it can be calculated that the rate of decomposition of cementite is 12 times that of graphitization of the pearlite.

Alloying Elements and Their Effect—Silicon is the cheapest and most important alloying element used to increase the rate of graphitization. It aids the decomposition of the intermetallic compound Fe_3C (iron carbide). An excessively high silicon content causes graphitization when the metal is poured and results in gray iron. A very low content causes, on malleabilization, such a slow rate of graphitization as to render the process impracticable. It has been shown experimentally that the carbon-silicon relationship indicated by the following equations is desirable:

$$C/Si = 0.9 \text{ to } 3.1$$
$$C + Si = 3.6\% \text{ to } 4.2\%$$

When these requirements are satisfied, graphitization takes place at the optimum rate, provided that the content of other elements does not exceed certain permissible limits. For example, an excess of manganese stabilizes carbides, and an excess of sulphur prevents the normal decomposition of carbide. An excess of phosphorus causes the formation of iron phosphides, which render the iron hard and brittle. The phosphorus content under no circumstances should exceed 0.2 per cent. Manganese and sulphur contents should be kept as low as possible because of their harmful properties.

The sulphur cannot, however, be avoided altogether since it is introduced into the casting in the pig iron, scrap and, mainly, in the coke. The undesirable effect is counteracted by the addition of manganese which forms with the sulphur the intermetallic compound MnS (manganese sulphide). If the sulphur content is low, its effect is negligible. With a content of about 0.2 per cent, the effect begins to be noticeable and, with a still higher content—0.25 or 0.3 per cent—the malleable casting shows a white fracture, and its deformability is impaired.

Experiments show that the permissible relationship of the manganese to the sulphur content is given by the following equations:

$$Mn = 1.7S + 0.15 \text{ (lower limit)}$$
$$Mn = 1.7S + 0.25 \text{ (upper limit)}$$
or
$$1.7S + 0.15 < Mn < 1.7S + 0.25$$

If the required low sulphur content cannot be obtained, a desulphurizing treatment (with soda ash, etc.) can be carried out in an auxiliary furnace or even in the teapot ladle. Such a treatment permits, however, only a limited removal of the sulphur (up to 0.05 per cent) and results in an excessive drop in temperature, which is critical for malleable iron.

Laboratory tests (see later) have shown that when the desired carbon to silicon and manganese to sulphur ratios are maintained, one quarter of the total graphitization time is required for decomposition of cementite (at high temperatures) and three quarters for decomposition of pearlite.

Alloying Elements—The effect of the variation of the alloying elements on graphitization time was studied. It was found that a functional relationship exists between the carbon to silicon ratio and the time required for decomposition of cementite (t_1 in the equation below), provided that the requirements laid down in the equation regarding the permissible relationship of manganese to sulphur content are satisfied.

The relationship is given by the equation $C/Si = 0.5 + 0.016\ t_1 + 0.012\ t_1^2$, calculated from the graph in Fig. 1. Analysis of the equation confirms certain characteristics of the graphitizing process:

1. The curve does not cut the time axis, since the ratio C/Si cannot be zero.

2. The curve cuts the C/Si ratio axis at 0.5. In practice this means that the maximum silicon content, represented by this point, is twice that of the carbon. At such a high silicon content, the graphitization time would be zero since the process actually would be completed during solidification.

3. The character of the curve, which shows that the graphitization time increases with the increase of the ratio C/Si, confirms the assumption that it increases with the increase of the carbon content and with the decrease of silicon content.

Experimental Procedure—Foregoing results and the accompanying diagram were obtained from tests conducted on chilled white iron bars routinely poured as part of the control in one of the leading foundries in Israel. The raw materials for the acid-lined cupola, melting at the rate of 4 tons per hour and pouring 20 tons a day, were hematite pig iron dead mild steel and foundry returns. Test bars ½-in. in diam and 4 in. long were made in a mold with four cavities and cast with each ton of metal poured. Two of the bars were used for chemical and physical tests; the other two were labeled with cast number, date and analysis number and were stored.

From the latter, amounting to several thousand bars, specimens were chosen and classified into eight groups with the following C/Si ratios: 0.5, 0.9, 1.0, 1.5, 2.0, 2.5, 3.0 and 3.1. Chemical analyses through which the several C/Si ratios were established followed ASTM E30-45 for carbon by the direct combustion method and silicon by the acid method. Each of the eight groups comprised 160 bars with identical chemical and physical properties.

One-half of each group (bars 1 to 80) was placed in an annealing oven at 950°C. At intervals of one-half to one hour, a bar was withdrawn, cooled quickly in liquid and subjected to microscopic examinations. After this, a piece of about 20 mm was sawn off and the combined content determined chemically. In such a way, the minimum time necessary for graphitization at 950°C was determined for all groups, "minimum time" being defined as the period after which no further change could be found in the combined carbon content.

The other half of each group (bars 81 to 160) was given the proper first-stage treatment in ac-

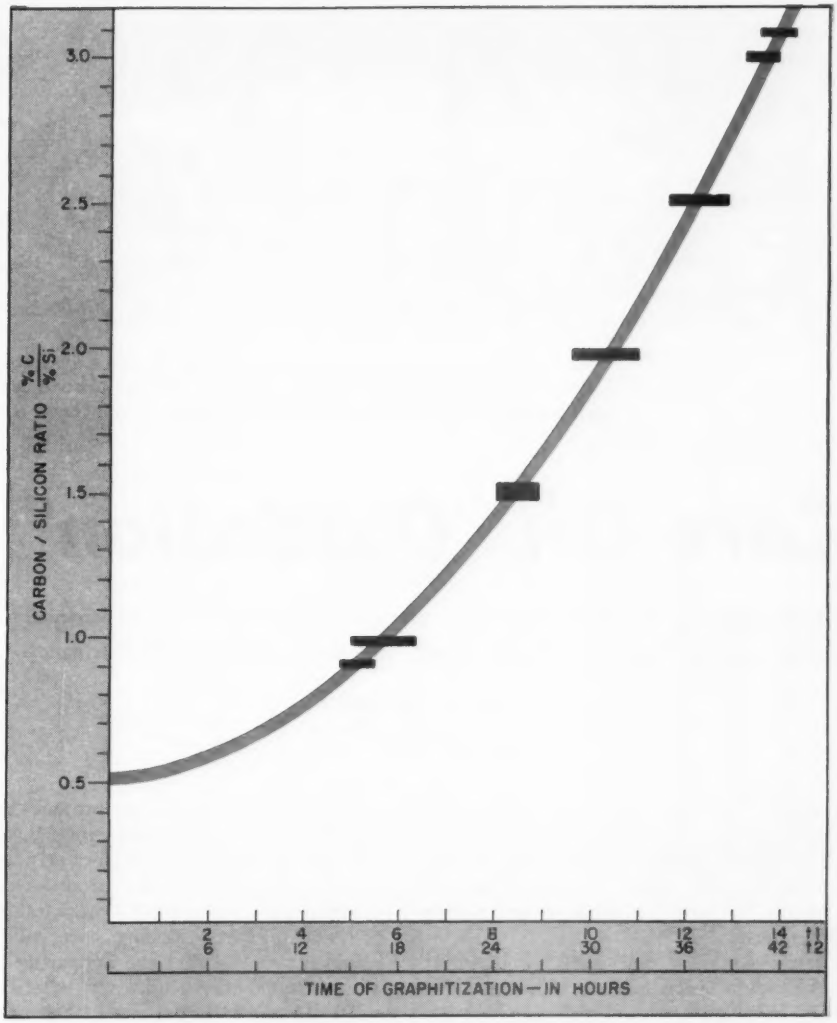

Fig. 1—Relationship between carbon-silicon ratio and time required for decomposition of cementite was calculated from this graph, which was obtained from tests conducted on routinely poured chilled white iron bars

cordance with the results of the above tests, and the annealing experiment was repeated at 710°C to complete graphitization. A bar was withdrawn from the oven at intervals of one-half to one hour, cooled slowly in air and examined under the microscope. Specimens were accepted as completely annealed when no traces of pearlite could be detected under the microscope.

These facts thus were established: 1. The second stage takes three times as long as the first stage. 2. A relationship exists between the C/Si ratio and the annealing time of the iron.

Remarks—C/Si ratios above 3.1 were not studied since they do not occur in practice. The practicability of a given ratio is determined not only by production considerations, but also by the proposed use of the material. For example, a carbon content of about 2 per cent or less in white iron would give a strong malleable cast iron with high deformability. The strength can be as high as 40 kg/mm^2, and the elongation 25 per cent on a gage length of 50 mm. The melting temperature of such an iron is so high that special conditions and equipment are necessary. On the other hand, a carbon content of 3 per cent would give a tensile strength of only 27 kg/mm^2 and an elongation of 5 per cent on a 50-mm gage length.

In the course of the graphitizing process at high temperature, most of the carbon is burned out of the iron, giving a final carbon content of 1.2 to 2 per cent in malleable iron castings of relatively thin cross section.

It was observed that the size of the graphite particles formed in the graphitizing process depends on the chemical analysis of the iron and on the temperature and duration of the process. It can be assumed that the size of the graphite particles affects the strength and deformability of the iron as well as its machinability and chip formation.

In view of the importance of these data, research on this subject is being continued.

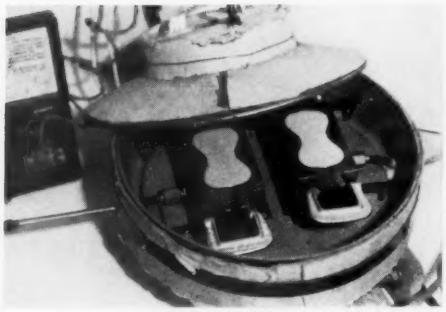

Fig. 1 (left)—View shows general arrangement of test oven rigged so that atmosphere surrounding test cores and in interstices of sand grains could be controlled. Fig. 2 (right)—Showing interior arrangement of test oven

Core Oil "Oxidation"

Investigation indicates that core oils can be compared and judged realistically only by testing them for their physical performance

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WHAT happens to a core oil when the core is baked? The stock answer is, "The oil is oxidized." Actually, some rather complex reactions take place in the core oven and they are little understood. We will not attempt to explain these reactions here.

It has been recognized for many years that well baked or even overbaked oil bonded cores produce more satisfactory castings than do underbaked cores. As organic binders are baked well past their peak strength they become darker in color and eventually little but a coke-like material remains of the organic binder. Since this coke appears to be mostly carbon it seems that other elements, including oxygen, have been driven off.

Because a large majority of dry sand cores depend largely on core oil to develop proper dry strength, let us see how important oxidation really is.

The supposition that oxidation is responsible for converting a liquid oil into a solid film goes back to the days when core oil was linseed oil. Linseed oil must oxidize to form a satisfactory film. Core oils consist usually of a drying oil such as linseed oil, soybean oil, China wood oil, menhaden (fish) oil or others blended with a vegetable or mineral resin and a thinner such as kerosene.

The early compounded core oils were blends of linseed oil, wood resin and kerosene. They behaved much like linseed oil. In the middle 1930's, by-product resins or polymers from the petroleum refineries began to compete with the wood resins. These early, dark-colored core oils again resembled linseed oil in baking behaviour and were lower in cost. Beginning around 1945 and 1946, higher quality petroleum resins became available for core oil materials. In the early 1950's the competition of phenolic and urea formaldehyde synthetic resins induced the core oil manufacturers to develop faster baking core oils. Now several core oil type binders are appearing on the market that behave only slightly like linseed oil.

Beginning with the use of the better petroleum polymers, sand technicians noticed that core ovens with little or no provision for the introduction of fresh air baked these core oils just as well or even better than those ovens which supplied oxygen-bearing fresh air in liberal quantities.

To investigate the relative importance of oxidation to straight thermal polymerization on various types of core oils, a small test oven was rigged so that the atmosphere surrounding the test cores and in the interstices of the sand grains could be controlled. Fig. 1 shows the general arrangement.

A cast aluminum desiccator was equipped with electric heating elements placed against the bottom and lightly insulated with sheet asbestos. Temperature was measured with a thermocouple and pyrometer. The temperature was manually controlled with a variable transformer. CO_2 process test gassing fixtures were arranged in the oven as shown in Fig. 3. Dry air or dry nitrogen was admitted to the oven through copper tubing at a rate of 0.25 liters per minute passing through each tensile test specimen. Fig. 2 shows the interior arrangement of the oven.

The oven was preheated to 500°F before the specimens were inserted. Each specimen was baked at 450°F oven temperature for one hour

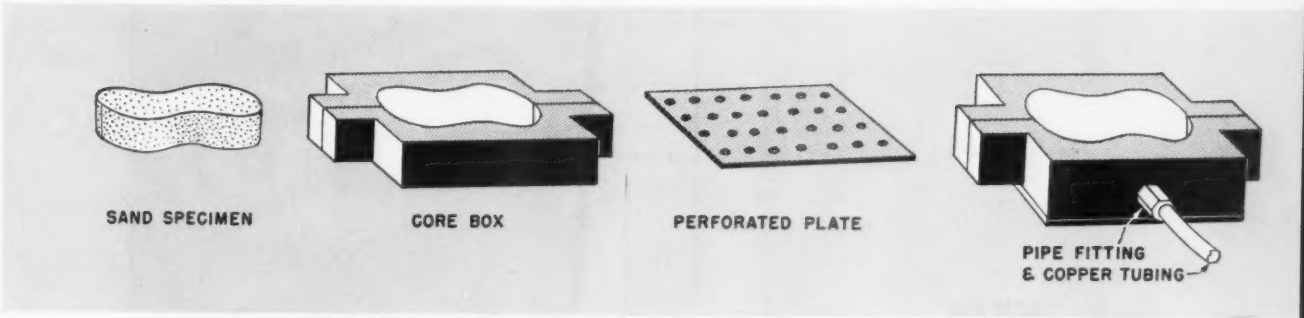


Fig. 3—Illustrating how the CO_2 process gassing fixtures were arranged in oven. Dry air or dry nitrogen was admitted to oven through the copper tubing at a rate of 0.25 liters per minute

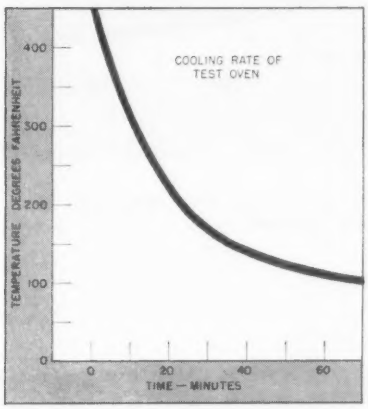
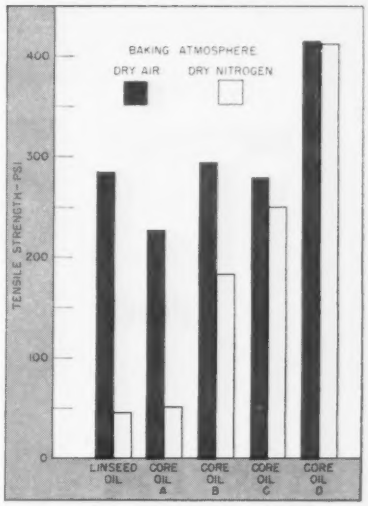


Fig. 4—Chart shows rate at which the oven was cooled. Selected atmosphere continued to flow through specimens until they had cooled to a temperature of 100°F

Fig. 5 — This chart shows how core oils of the older type required more oxygen than the more modern oils to develop good strengths



with the exception of oil D, which was baked for 10 minutes at the suggestion of the manufacturer. The power was then turned off and the oven cooled with a small centrifugal blower and an electric fan. Cooling rate is shown in Fig. 4. The selected atmosphere continued to flow through the core specimens until they had cooled to 100°F. They were then placed in a desiccator where they remained overnight before testing.

The sand mixture used was dry AFS standard testing sand and 1 per cent by weight of each core oil. Sand and oil were mixed for 10 minutes in a small laboratory paddle type mixer. The test specimens were prepared within a few minutes after mixing.

Fig. 5 shows that the older types of core oils required the oxygen in the air to develop appreciable strengths. The more modern core oils appear to rely progressively less on oxidation to develop good film strengths.

Core oils A and B were of the following composition:

	A	B
Linseed oil	35%	35%
Old type petroleum polymer	50%	
Improved petroleum polymer		50%
Kerosene	15%	15%

Oils A and B were formulated in the laboratory and are intended only to typify the core oils of the 1930's and 1940's. Oil C is a commercial fast baking core oil that has been in use since 1950. Oil D is a new type of binder of recent development.

With this evidence of decreasing dependence of core oils on oxidation, perhaps the core oven designers will investigate the necessity for large quantities of fresh air. It is possible that better efficiency may be achieved by using more recirculated air for baking. Of course, we still have to dispose of water and solvent vapors.

The foundry sand technician should also recognize the desirability of adjusting the fresh to recirculated air ratio in his laboratory oven so that the baking conditions will resemble those of the production ovens. Only in this manner can he perform tests which will reliably predict the performance of core binders under production conditions.

Twenty or thirty years ago, chemical tests indicated roughly the composition of core oils and were related to performance. With the advent of dark-colored core oils, the color was sometimes specified. In recent years core oils have been developed to a point where these criteria are all but meaningless. We can only compare and judge core oils realistically by testing them for physical performance under the conditions prevailing in the core room and carefully simulating and controlling these conditions in the laboratory.

A NEW METHOD FOR STUDYING Riser Requirements

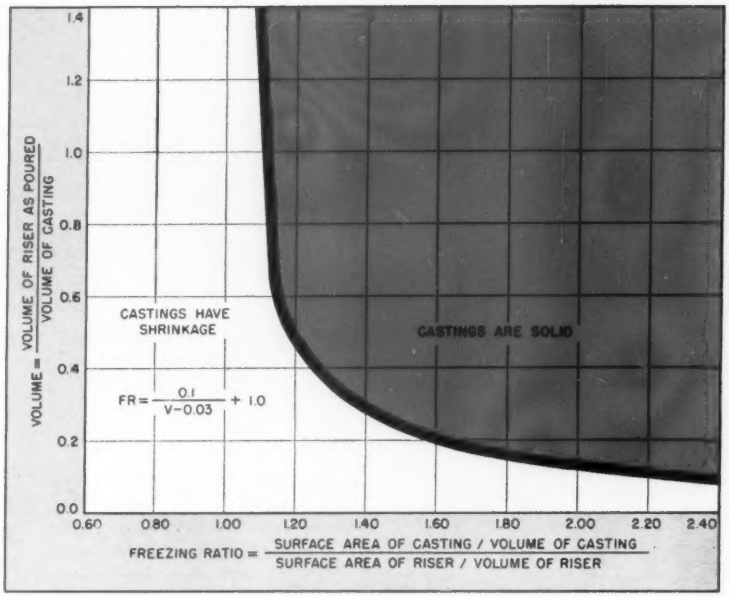


Fig. 1—Illustrating the relation between freezing time and volume in riser systems for steel castings[2]

SUMMARY

A new method has been developed for presenting in graphical form the results of research on the size of risers required for castings of simple shapes.

By plotting the data on log-log co-ordinates, and by selecting suitable parameters for the co-ordinates, the data from several different investigations were found to produce straight lines. Once it was established that the data could be plotted by a system which yielded straight lines, it became much easier to analyze and to study the feeding requirements of various metals and alloys. Furthermore, the number of experiments needed to study a new metal or alloy could be reduced considerably without seriously affecting the accuracy of the conclusions.

Graphs involving straight lines have the further advantage that extrapolation and interpolation can be performed with considerable confidence.

THE PROPER risering of a casting to avoid unsoundness involves two factors. The first is the feeding distance within the casting. For any particular metal, this distance is determined by the geometry and the size of the casting. Even a very large riser will not avoid unsoundness in a casting in which some section freezes so as to block the feed of molten metal from the riser to some remote part of the casting which still requires feeding.

The problem of obtaining suitable feeding distances in a casting is solved by use of the proper number and placement of risers. This factor of feeding distance of a casting is not taken into account in the present presentation, but methods are available for solving the problem of feeding distance.

The second factor involved in risering of a casting involves the relative rates of solidification of the riser and the casting. A riser which is so small that it will stop feeding before the casting has solidified will result in "under-riser" shrinkage in the casting. A riser which is so large that it contains an unnecessary excess of metal will produce a sound casting adjacent to the riser, but will result in a low yield of useful casting in relation to the amount of metal poured. This presentation deals specifically with this one factor of riser size.

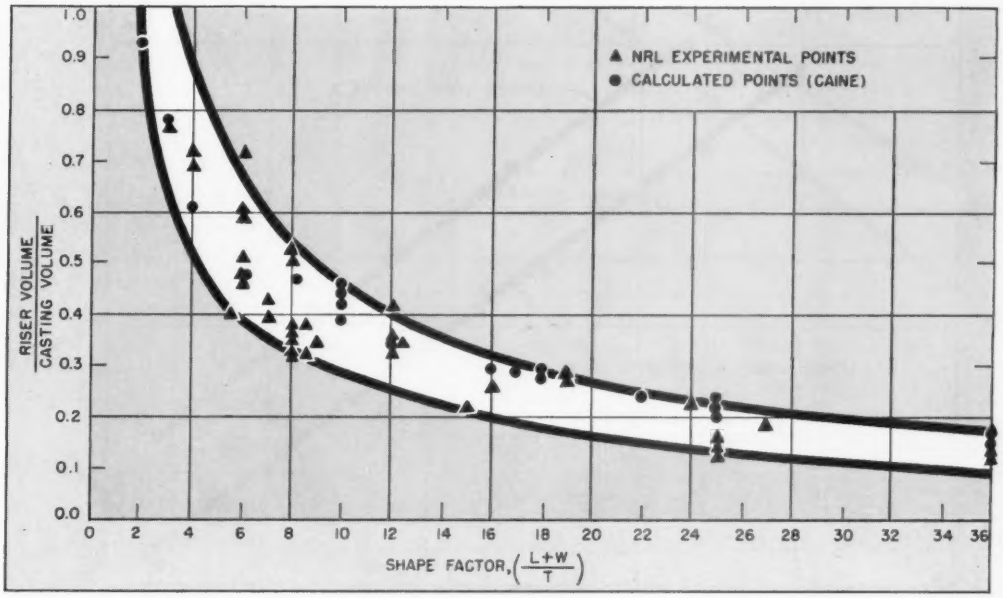


Fig. 2—Relation of casting shape factor to minimum effective riser volume as a fraction of casting volume for steel[3]

# of Castings

By JOHN VARGA JR.
Battelle Memorial Institute
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Some Historical Background—One of the first successful analytical approaches to the proper risering of castings was made by N. Chrorinov[1] in 1939. He found that the time of solidification of a casting (or a riser) could be estimated by calculation, and was influenced not only by the size of the casting, but also by the relation of the volume of the casting (or riser) to its surface area. Presumably, if the time for solidification of a riser was longer than the time for solidification of the casting, then the casting would be sound, at least within the area where the riser is effective.

This work was followed by those of many other experimenters working along similar lines, all trying to elevate risering from an art to a science. About 1949, Caine[2] showed that much of the calculation proposed by Chrorinov could be eliminated. Caine was able to show a relationship between the relative size of the riser and a parameter which he called the "freezing ratio." Caine's relationship and the definitions of his parameters are shown in Fig. 1.

Although Caine simplified the problem of risering, his method still required a fair amount of calculation. In 1955, Bishop, Myskowski, and Pellini[3] advanced the science still further when they described their system which eliminated Caine's fairly complicated "freezing ratio" and substituted for it a "shape factor," which is simply the sum of the length plus the width of a simple casting (or section of a casting), divided by its thickness. The type of relationship developed for steel by Bishop and his co-workers is shown in Fig. 2.

Development of the New Method—In the conduct of research at Battelle on the solidification and feeding characteristics of metals, it was decided to investigate the possibility of presenting risering information in a different form which would make test data easier to interpret and easier to apply to production problems. The form of curves such as those in Fig. 2 suggested the possibility of replotting such data on log-log co-ordinates. When this was done for various points taken from the upper and lower curves of Fig. 2, the results were as shown in Fig. 3. Two straight lines were obtained.

The effectiveness and consistency of the new method were verified by using it to present the risering requirements for each of a series of high-alloy casting metals under investigation at Battelle. The results of feeding experiments using top risers on two different types of high-alloy metals are shown in Fig. 4. Study of this figure will show that if straight lines are always obtained (as they have been so far), then only several experimental castings need be made to establish the

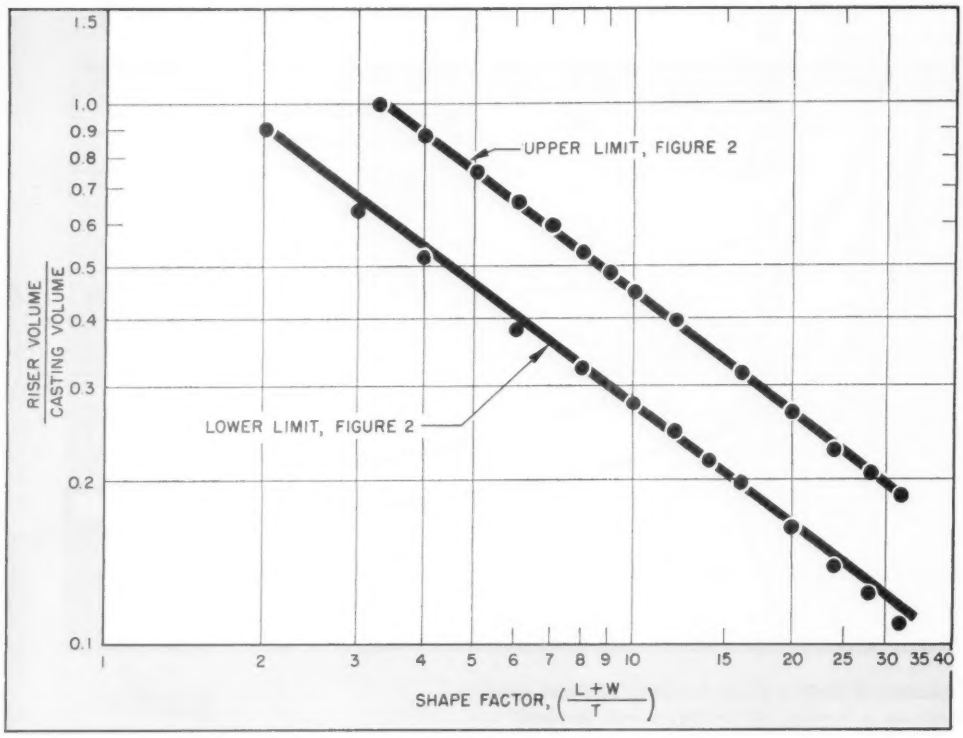

Fig. 3—Log-log relation between the shape factor and relative riser volume

sizes of risers required for a wide variety of casting shapes and sizes.

To study further the validity and significance of the new system, reference was made to the work of several other investigators who were concurrently studying the risering and feeding characteristics of other metals. In 1955, Flinn, Reese, and Spindler[4] published their results on the feeding of nodular iron with side risers and end risers. Reworking of their data and replotting of it according to the new system gave the results shown in Fig. 5. Straight lines were again obtained.

In 1956, Bishop and Ackerlind[5] published the results of their work on the top risering of nodular iron. They presented their data in the same form as Fig. 2. Although there was some scatter in their data, they were able to group the data into two general levels of carbon equivalent (TC + 1/3 Si), and show an effect of carbon equivalent upon risering requirements. Replotting of the data from the Bishop-Ackerlind report on log-log paper yielded the situation shown in Fig. 6. It was immediately apparent that excellent linearity was obtained for irons of a given carbon equivalent, and that the effect of carbon equivalent on the feeding requirements for nodular iron was more definite and more consistent than had been shown in the method of presentation of data used in the original report.

Limitations of the New Method—The new method of presentation, unhappily, does not solve all of our risering problems. It has so far been proved applicable only to simple castings, or to castings which can be considered as a connected series of simple shapes. A single curve presented in the new system applies only to one particular metal and to one type and one geometry of riser. Notice the effect in Fig. 5 of changing from a side riser to an end riser. In the work at Battelle, it has been found that side risers are much less effective than top risers of the same size. Also, it is pertinent to point out that in the research at Battelle in which the new method was developed and found to be highly reproducible, the geometry of risers was fixed so that their height was equal to their diameter.

Conclusion—This new method of presentation of riser data is recommended to other investigators as a useful tool which may help them to wring more information out of their data and to reduce the number of test castings which must be made to determine the size of riser needed on a particular casting.

Acknowledgement—This paper is based on some of the results of a research program sponsored by the Shop Practice Committee of the Alloy Casting Institute. Their permission to publish is gratefully acknowledged.

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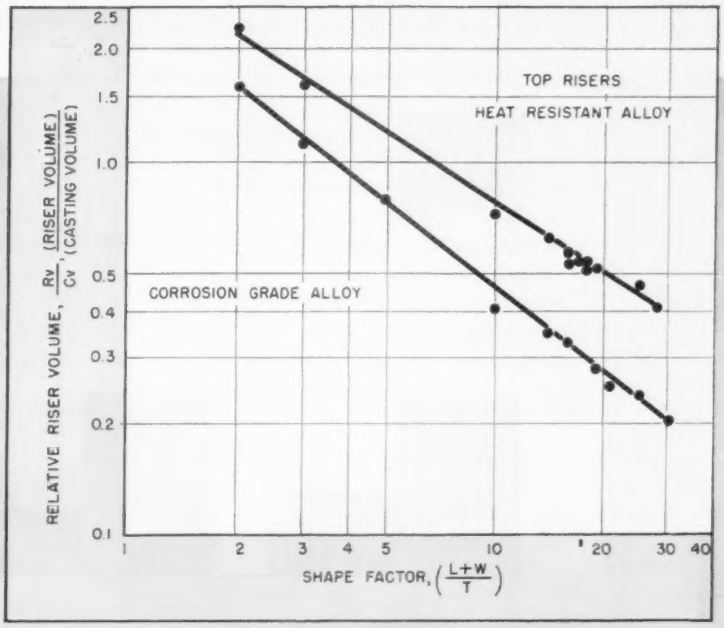


Fig. 4—Relation between shape factor and the relative riser volume for two high-alloy metal compositions

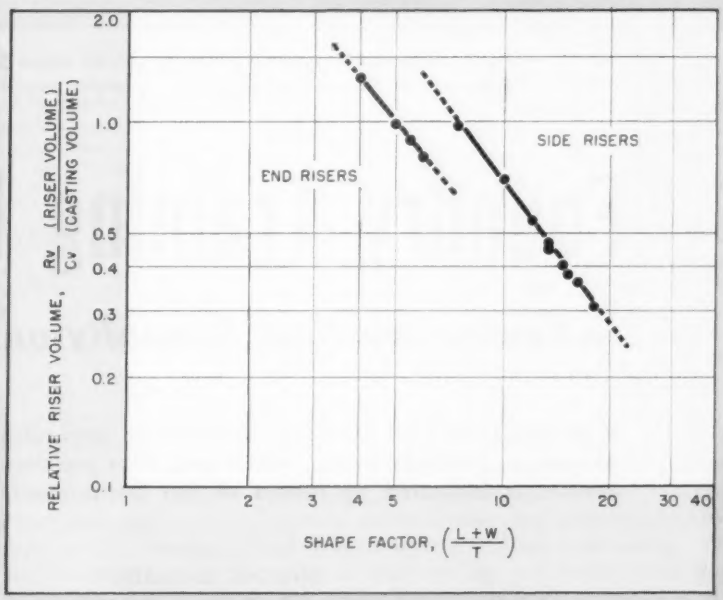


Fig. 5—Relation between shape factor and the relative riser volume for a nodular iron[4]

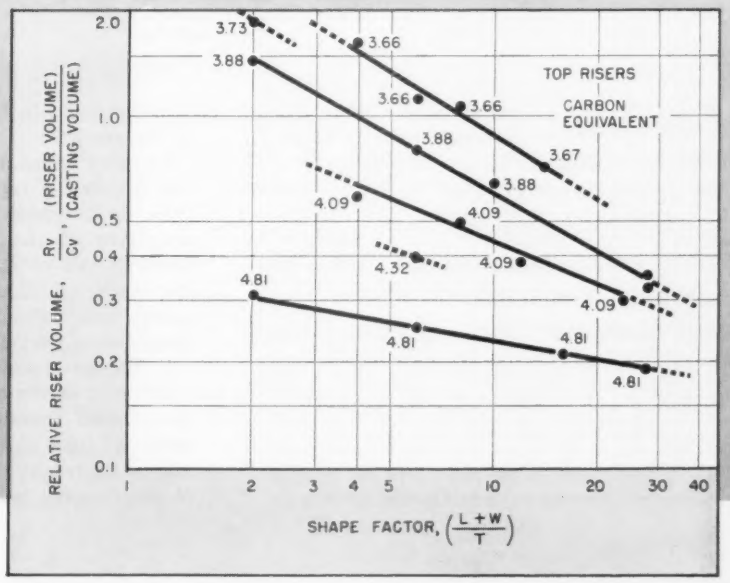


Fig. 6—Showing relation between riser volume and the shape factor for nodular iron[5]

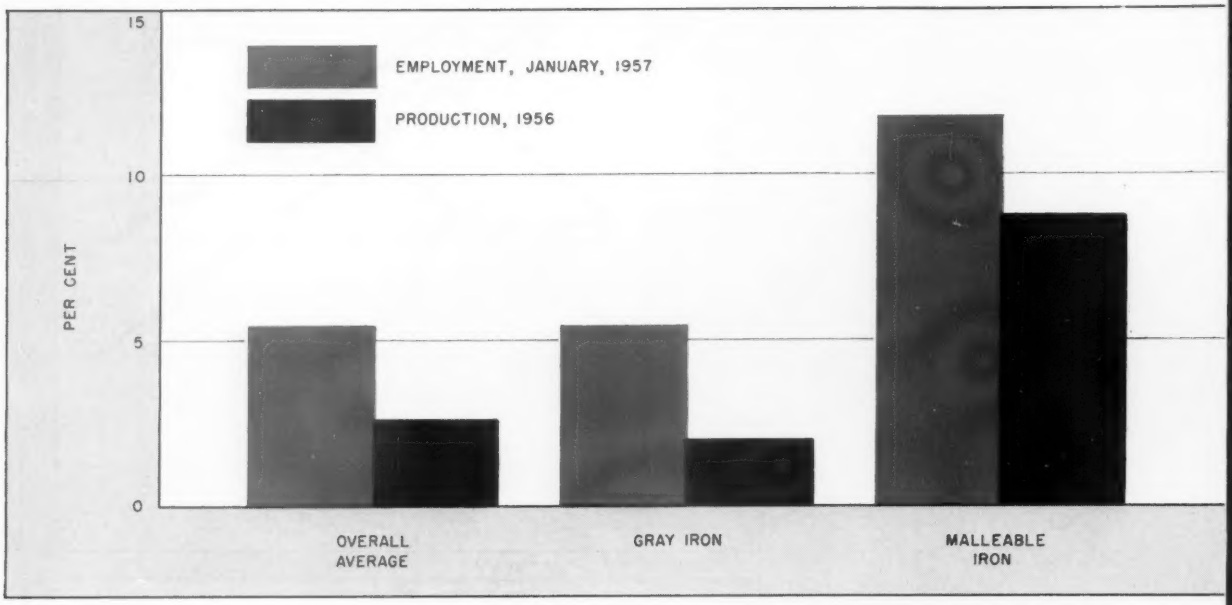


Fig. 1—Foundries included in the study employ about 5 per cent of the workers in independent foundries and produce a somewhat smaller proportion of the castings

Foundry Training Needs

In Semiproduction, Specialty and Job Shops

A growing need for training programs for such jobbing foundry employees as patternmakers, bench and floor molders and hand coremakers is indicated by results of this Department of Labor survey

By JOHN S. McAULEY

Bureau of Apprenticeship and Training
United States Department of Labor
Washington

A SURVEY of skill requirements and training needs in semiproduction, specialty and job foundries was conducted in January, 1957, by the U.S. Department of Labor, in co-operation with a committee representing the various branches of the industry.* The Committee assisted in the preparation of the questionnaire, planned visits to foundries and guided preparation of the report.

Foundry associations reviewed the questionnaire and selected a representative group of foundries from each branch of the industry. Field representatives of the Bureau of Apprenticeship and Training and of state apprenticeship agencies visited each of these foundries to obtain the required information. This study is based on statistical data provided by officials of 101 foundries.

Foundries included in the study represent about 5 per cent of the total employment in the nation's independent foundries, as indicated in Fig. 1. In terms of tons of castings produced, the surveyed plants represent a somewhat smaller proportion of the foundry industry.

*Members of the Foundry Advisory Committee include Fred G. Sefing, International Nickel Co., New York, chairman; C. R. Culling, Carondelet Foundry Co., St. Louis; Roy A. Gezelius, General Steel Castings Corp., Eddystone, Pa.; Harry D. Horton, Ingersoll-Rand Co., Phillipsburg, N. J.; Peter E. Rentschler, Hamilton Foundry & Machine Co., Hamilton, O.; Ashley B. Sinnett, American Foundrymen's Society, Des Plaines, Ill.; and Frank G. Steinebach, FOUNDRY, Cleveland. U.S. Department of Labor staff members who participated in the survey are Richard B. Brown, Elliott French, John S. McCauley, William J. Moore and Joseph H. Schuster.

This report was presented at the 1957 AFS Congress.

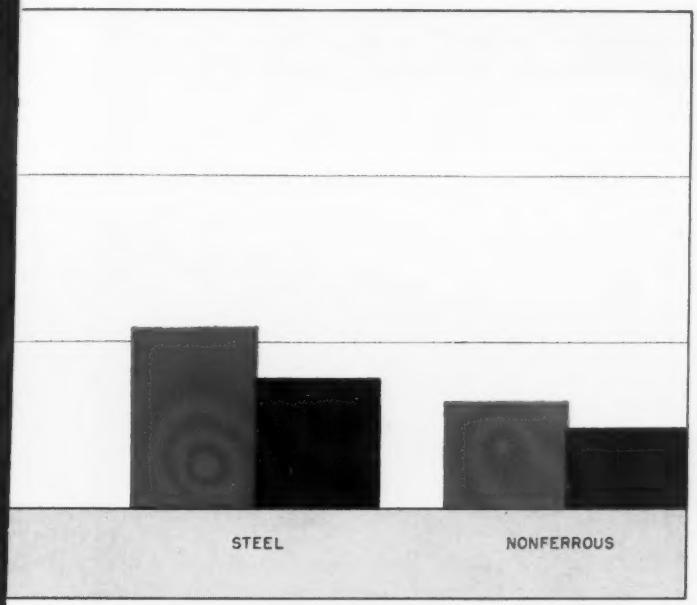


TABLE I—Foundries Included in Study, by Type of Foundry and Employment

Type of Foundry	Total	Employment: Under 50	50 to 99	100 to 199	200 to 399	400 to 699
Total	101	23	21	23	25	9
Gray iron	42	3	12	10	14	3
Malleable	11	—	—	3	5	3
Steel	13	1	—	4	6	2
Nonferrous	35	19	9	6	—	1

Table I is a classification of the foundries by type and by size. Operating or service workers comprised 82 per cent of total employment; foremen, 5 per cent; engineers, 1 per cent; technicians, 1 per cent; and administrative and office personnel, 11 per cent. Principal operating occupations were chipper and grinder, machine molder, shakeout man, floor molder and hand coremaker.

SECOND OF TWO STUDIES

This survey constitutes the second study of skill requirements and training needs in the foundry industry conducted by the U. S. Department of Labor. Results of the first survey, which covered only highly mechanized foundries, were reported in FOUNDRY, July, 1956, p. 94. This second study covers semiproduction, specialty and jobbing foundries.

Main service occupations were patternmaker and maintenance mechanic.

Length of Training—Considerable variation was reported in the length of time required to train workers in different occupations, as is shown in Fig. 2. The typical training time for a ladleman was only two months, as compared with four years for a patternmaker. There also was variation among foundries concerning the training time required for specific occupations, especially machine molder. To indicate the extent of this variation for each occupation, the chart shows the middle range within which half of the responses fell.

During the next few years, a considerable number of workers need to be trained as replacements for losses due to death and retirement. The survey showed that workers in foundries of the types surveyed are, on the average, older than workers throughout industry in general. For example, more than 26 per cent of the patternmakers were over 55, compared with 18 per cent of all male workers in nonagricultural establishments in the United States. In fact, 17 per cent of the patternmakers were over 60 years of age. Heavy concentration of older workers also was reported in floor and bench molding and in hand coremaking. In sharp contrast, most of the technicians were under 35

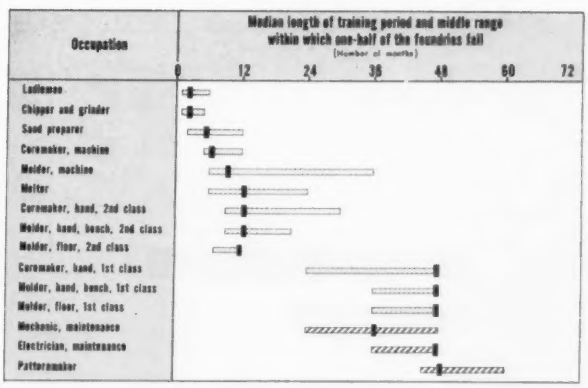


Fig. 2—Considerable variation was reported in the lengths of time required to train employees for various occupations in the foundry industry

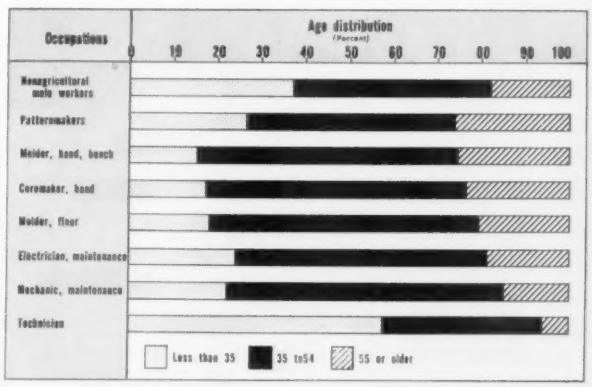


Fig. 3—As shown here, age distribution of key foundry workers varies significantly. Patternmakers and hand molders and coremakers are older

TABLE II—Distribution of Employment by Occupation and Type of Foundry (January, 1957)

Occupation or Occupational Group	Total	Gray Iron	Malleable Iron	Steel	Nonferrous
			NUMBER		
Total	16,829	7,767	3,281	3,182	2,599
			PER CENT		
Total	100.0	100.0	100.0	100.0	100.0
Selected service occupations:					
Electrician, maintenance	0.6	0.5	0.8	1.0	0.5
Mechanic, maintenance	2.3	2.1	1.9	3.8	1.5
Millwright	0.5	0.7	0.6	0.2	0.1
Pattern storage man	0.8	0.8	0.4	1.1	0.6
Patternmaker	1.6	1.4	1.9	1.3	2.1
Selected operating occupations:					
Chipper	5.4	5.2	2.6	9.4	4.5
Coremaker, hand					
1st class	3.7	5.3	1.1	2.6	3.4
2nd class	0.7	0.6	0.4	0.5	1.4
Coremaker, machine	2.1	2.3	2.3	1.0	2.7
Craneman	2.1	2.4	0.2	4.2	0.7
Grinder	5.6	4.8	6.4	5.3	7.0
Ladleman	2.6	2.9	2.7	1.7	2.7
Melter	2.0	1.8	1.4	1.3	4.0
Molder, hand, bench					
1st class	1.5	1.5	0.9	0.9	2.8
2nd class	0.2	0.3	*	0.1	0.4
Molder, floor					
1st class	3.7	5.6	0.3	3.0	3.3
2nd class	0.8	0.7	0.1	2.1	0.3
Molder, machine	9.0	8.4	15.3	4.8	7.3
Sand preparer	2.3	3.3	1.0	1.9	1.9
Shakeout man	4.5	4.3	5.1	3.8	5.3
Welder:					
1st class	1.2	0.9	0.1	3.9	0.3
2nd class	0.3	0.2	0.3	0.6	0.3
Other operating and service occupations:	27.0	25.0	37.0	25.5	21.9
Trainees:					
Coremaker	0.4	0.6	0.1	0.1	0.5
Molder	1.8	3.4	0.7	0.2	0.6
Patternmaker	0.2	0.2	0.4	0.1	0.2
Other trainees	0.4	0.7	0.1	0.1	0.1
Technicians:					
Chemist assistant	0.2	0.2	0.2	0.4	0.2
Metallurgist assistant	0.3	0.3	0.4	0.2	0.2
Sand technologist	0.1	0.1	0.3	0.2	*
Other	0.4	0.2	0.5	0.7	0.8
Foreman (nonworking)	4.5	4.5	5.1	5.1	3.5
Engineer, metallurgist and other professional technical personnel	0.8	0.8	0.8	0.9	0.8
Administrative and other management personnel, including office workers	10.4	8.0	8.6	12.0	18.1

*Less than 0.05 per cent

years of age. Fig. 3 shows the age distribution.

To indicate the trend in skill requirements, the foundries were asked to provide information on machinery used in various foundry operations and on their plans for additional mechanical equipment. Most of the foundries had definite plans for installing machinery, as is indicated in Fig. 4. About one-fifth were considering the matter, but had not yet formulated definite plans. The remaining one-fourth did not have any plans to install mechanical equipment.

In addition to providing replacements for those who die and retire, more workers will be needed

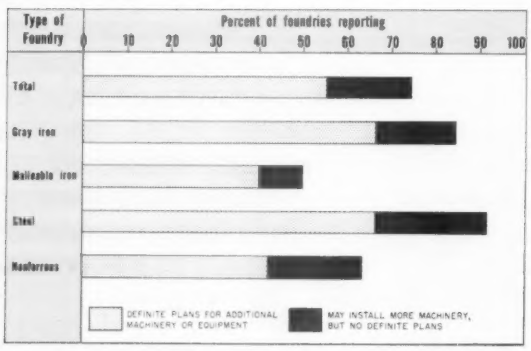


Fig. 4—Most of the foundries had definite plans for installation of machinery, as indicated here

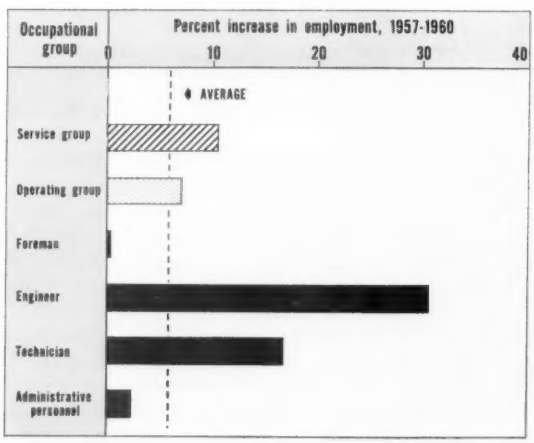


Fig. 5—Employment increases are expected in all occupational groups by 1960—especially engineers

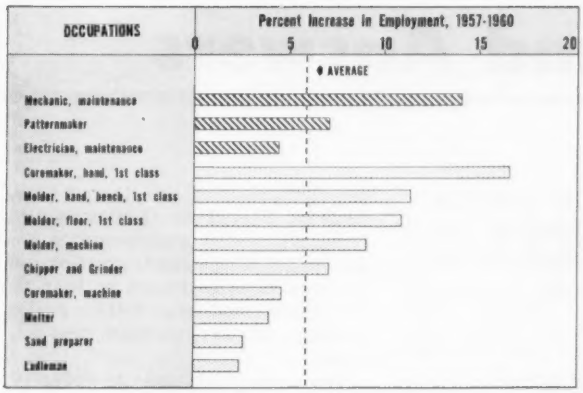


Fig. 6—Illustration shows more detailed picture of expected changes in the operating and service jobs. Some are growing much faster than others

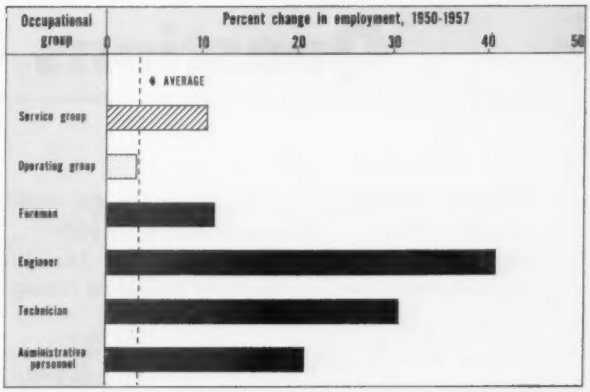


Fig. 7—From 1950 to 1957, these significant employee changes occurred. There was a sharp increase in the number of engineers and technicians

for growth and expansion. These foundries expect a 6 per cent increase in employment by 1960. All occupational groups are expected to share in the increase. An especially sharp increase is expected for engineers. In contrast, only a slight increase is foreseen for foremen. This difference may reflect a shift of functions from foremen to engineers.

A more detailed picture of expected changes in operating and service jobs is provided in Fig. 6. Foundry officials indicated that some of these occupations are growing much faster than others. Significant increases are expected in the employment of maintenance mechanics and hand coremakers.

Anticipated increases in employment were compared with employment changes that occurred from 1950 to 1957. During this period, there was a sharp increase in the number of engineers and technicians.

Only 480 workers were in training programs in January, 1957, in the foundries in the study. Training programs conducted by foundries in the various branches of the industry may be classified as follows:

Type of Foundry	Number of Foundries In Study	Total Conducting Training	Apprenticeship Training	Other Training
Total	101	65	25	40
Gray iron	42	29	13	16
Malleable	11	8	1	7
Nonferrous	35	17	9	8
Steel	13	11	2	9

Additional training should be developed, especially in foundries that are not training workers at the present time. The industry committee will appreciate suggestions concerning steps that might be taken by the foundry industry to insure the development of a sufficient number of trained workers. Suggestions should be addressed to the committee chairman: Fred G. Sefing, International Nickel Co., 67 Wall St., New York, N.Y.

TABLE III—Percentage Change in Employment Expected between January, 1957, and 1960[1]

Occupation or Occupational Group	Total	Gray Iron	Malleable Iron	Steel	Nonferrous
Total	5.9	8.7	2.0	0.3	13.1
Selected service occupations:					
Electrician, maintenance	4.5	20.0	0.0	4.5	*
Mechanic, maintenance	14.1	14.7	18.9	3.3	33.3
Millwright	17.9	11.9	*	*	*
Pattern storage man	7.0	13.5	*	10.0	*
Patternmaker	7.2	8.2	7.7	3.7	7.7
Selected operating occupations:					
Chipper	7.7	13.8	4.9	0.9	9.1
Coremaker, hand, 1st class	16.6	13.2	56.0	1.7	33.3
Coremaker, machine	4.7	5.9	−11.1	0.0	19.5
Craneman	2.1	4.1	*	0.0	0.0
Grinder	6.4	8.1	4.3	0.8	11.1
Melter	4.0	3.1	2.9	0.0	14.3
Molder, hand, bench, 1st class	11.4	18.6	10.5	0.0	7.4
Molder, floor, 1st class	10.9	12.8	*	0.0	18.6
Molder, machine	8.2	5.9	2.0	26.1	16.8
Trainees:	11.0	8.7	25.0	36.4	4.2
Technicians:	17.0	5.6	38.9	2.7	*
Engineer, metallurgist and other professional technical personnel	30.7	34.3	31.8	8.3	*

*Percentage not computed when number of employees in base period (1957) was less than 10.
[1]Unless otherwise indicated, figures shown are percentage increases. Based on data for 61 foundries that reported occupational data for January, 1957, and estimates for 1960—25 gray iron, 7 malleable iron, 9 steel and 20 nonferrous foundries.

Questions and Answers

Plaster molding process leaves rough surface on beryllium copper alloy . . . Pinholes cause trouble . . . Insulating riser sleeves decrease cooling rate . . . Handling methods for cupola emission . . . Making soil pipe fittings

Castings Have Rough Surfaces

QUESTION We operate a foundry in Norway and are trying to produce beryllium-copper and brass castings by the plaster molding process without too much success. We are using a permeable molding plaster obtained from the United States and follow the manufacturer's instructions on use. While the finished mold is not strong, the finish looks good, but the resulting casting has a rough surface. We are using a drying oven with air circulation and the temperature reaches about 450°F. Patterns used are wood or plaster.

ANSWER Successful application of the plaster molding method, like any other procedure, is based on skill and experience gained by careful attention to details. We suspect in your case that something along the line is being overlooked. You mention that you are following the plaster manufacturer's instructions on mixing and using the medium, but it may be well to study the operating conditions to see that those instructions are being carried on as described relative to plaster and water weights, water temperature, and air injection to develop the desired bubble size and permeability.

You mention that the molds are weak but appear to have a good finish. Lack of strength in the molds may be due to either high water content or high air content. We suggest that you hold the plaster-water mix at the ratio of 100 parts by weight of plaster to 80 parts by weight of water. Vary the volume increase by air injection from 50 to 70 per cent in several steps and select the volume increase which gives the desired strength.

If the mold finish is smooth, our guess is that the surface roughness you report is due to presence of moisture in the mold. It may be that the molds are not completely dry when removed from the oven, or possibly they are allowed to stand too long before pouring. Molds allowed to cool to room temperature will tend to pick up moisture and should be reheated before pouring. Several methods are suggested for determining whether the mold is dried properly in the oven. One is by the electrical conductivity method using a probe, suitable meter and power source. Another is use of a thermocouple inserted to the center of the heaviest section of the mold. When the temperature reaches 220°F, the mold is considered dry. Third method is by determining weight loss, but use of flasks causes considerable inaccuracy.

Troubled by Pinhole Porosity

QUESTION We occasionally make various aluminum castings in Nos. 43 and 143 alloys for use in our plant which produces molded pulp and plastic products, and have considerable trouble with pinhole porosity. Since these castings frequently are machined and used in an aqueous solution with a pH value of around 5.5, we encounter considerable corrosion. Assuming that pinhole porosity (not microporosity) may be responsible in some measure for the corrosive attack, we wonder how much value the relatively new scheme of vacuum degassing might have.

ANSWER While there is no doubt that vacuum degassing of the aluminum alloy melts will eliminate your problem of pinhole porosity, we are doubtful that it will have any effect on the corrosion difficulty. The pinholing undoubtedly is caused by absorption of gases during melting or, possibly, to inspiration or entrainment of air during pouring. As you indicate, gases absorbed during melting can be eliminated by vacuum degassing, but other means also are effective—procedures which you can carry on in your own foundry.

One of the first things is to see that the furnace atmosphere is slightly oxidizing; this is done by adjusting the flame so no traces of yellow are visible. Lacking instruments to determine furnace atmosphere composition, you can check the flame by impinging it on a cold piece of aluminum. If the flame is reducing, soot or carbon will be deposited.

The metal should be melted as rapidly as possible and removed from the furnace when the desired temperature is reached. Holding in the furnace promotes gas absorption, as does high temperature. Stirring of the molten metal should be kept to a minimum and done with a gentle pumping motion from the bottom upward.

The molten metal may be degassed by gaseous or solid agents. Dry nitrogen or chlorine are the gases used, and the solid materials are compounds which generate chlorine in contact with the molten metal. Nitrogen degasification is carried on at 1250°F, and a somewhat higher temperature can be used with chlorine. Solid agents usually are added when the metal is around 1350°F. Degasification should be conducted in well ventilated areas, particularly in the case of chlorine and solid materials since chlorine or hydrochloric acid fumes are given off.

Prevention of inspiration or entrainment of air during pouring requires use of tapered sprues with the big end up. The crucible or ladle lip should be kept as close to the sprue opening as possible. If the metal falls from any considerable height the stream tends to become turbulent and will entrain air. If location of the sprue openings requires that the crucible or ladle be raised high to direct the metal stream into them, it would be advisable to provide pouring basins which reach to the edges of the molds.

Use Insulating Riser Sleeves

QUESTION We will appreciate information on use of insulating riser sleeves of gypsum and perlite. We are familiar with use of exothermic risers but feel the extra cost involved in manufacture, etc. is not always justified in our application for gray iron castings and bronze pressure castings.

ANSWER We assume that your reference to familiarity with exothermic type material means that this material was employed in the form of riser and sprue sleeves. Sleeves made of gypsum or perlite are used in the same way, the only difference being that they function by reducing the rate of heat loss considerably as compared with that of green sand. Sleeves made with exothermic materials, in addition to reducing heat loss, also supply heat.

While gypsum sleeves will serve for brass and bronze, they tend to break down chemically at temperatures around 2400°F and are not suitable for gray iron. Perlite, which is a siliceous material, is more stable and can be used with higher melting point or pouring temperature metals such as gray iron, as well as with brasses and bronzes.

Such sleeves are available from manufacturers, but if you desire to try your hand at making them the following mixtures have been suggested: For gypsum sleeves—160 lb metal casting plaster and 100 lb water. Some recommend addition of up to 20 per cent portland cement. Formed sleeves are dried at 400°F or higher. For perlite sleeves—25 qt perlite, 2 qt portland cement, 1 qt bentonite and 5 qt water. Formed sleeves are baked at 350 to 450°F for 4 hr.

Sleeve thickness varies with riser diameter, and for those 4 in. and under the thickness is 1 in.; for risers 4 to 6 in. in diam, the thickness is 1½ in.; for 6 to 8 in. diam risers, the thickness is 2 in. while it is 3 in. for risers 8 to 10 in. in diam.

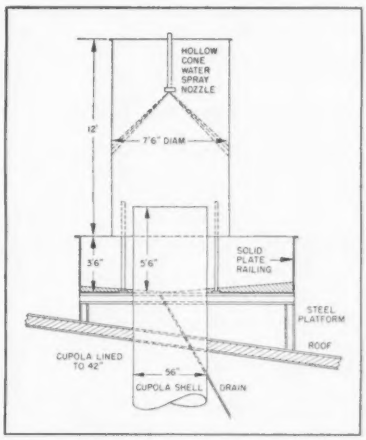
Removal of Dust From Cupola

QUESTION We are operating in our foundry in Hawaii a 42-in. ID cupola melting about 6 tons per hour and have a problem of smoke and fly ash during the operating period. We are using an oil burner for lighting up. We are interested in eliminating this condition and will appreciate any suggestions.

ANSWER Procedure in handling the problem of dust emission from the cupola will depend on the air pollution codes or ordinances in force in your area. Obviously, the more stringent the code, the more elaborate the equipment. In general, emissions from the cupola may be divided into three classifications according to particle size. One is cinder or relatively coarse particles ranging in size from 44 microns (about 325 mesh) upward. Another is dust which ranges from 1 to 44 microns in size, and the third is smoke and fume which is submicron in size probably from 0.2 to 0.5 micron.

Total amount of particles emitted, as well as the amounts in the several classifications, depend on such factors as the character and handling of the materials charged into the cupola, the air blast, etc. Indications are that the total emission ranges from 10 to 20 lb per hour per ton melted, and that the cinder portion constitutes 50 to 75 per cent, the dust portion 16 to 32 per cent, and the smoke and fume 8 to 16 per cent.

As might be expected, the finer the particle size the more difficult it is to remove. Removal of the relatively coarse or cinder fraction of cupola emission appears not too difficult, and many foundries have reported good results from water spray installations in the cupola stack, as shown in the accompanying illustration. In this case a hollow cone type nozzle with renewable ½-in. orifice was used to supply water at the rate of 15 gallons per minute at 35 psi. Equipment of this type, which includes baffles and deflectors for higher efficiency, is available from manufacturers.



Coarser particles in cupola emission can be controlled by water spray

With decreasing particle size, as in the case of the dust and smoke and fume fractions, the removal involves use of closed tops on the cupolas and gas igniters to insure complete combustion of the gases. It also means employment of dry or wet centrifugal collectors, bag-type filters and electrostatic precipitators; the latter two units are essential for removal of the finest particles. Detailed information on such equipment and its application can be obtained from the various manufacturers.

Producing Soil Pipe Fittings

QUESTION We understand that in the United States there is in widespread use a molding system employing a shell pattern for production of sanitary or soil pipe fittings. The pattern is similar to the fitting, parted in the center, and is employed to make the mold and core at the same time. Is there any book describing this method of molding that we could obtain? Also is there any book giving information on use of graphite-calcium carbide as mentioned in "Injection Process Permits Use of High-scrap Cupola Charges" which appeared in the March issue?

ANSWER Practice of using shell patterns in producing soil pipe fittings is in use to some extent, and as you point out the procedure permits making molds and cores with one piece of equipment using the same green sand for both. The half patterns in the form of shells with the usual shrinkage allowances are dowelled so that the best possible match is obtained. In the production of molds and cores two different procedures may be followed. Difference between the two is in manipulation of the molds after certain steps common to both procedures.

In both methods one half of the pattern is located on a follow board, hollow side down as indicated in Fig. 1. A flask is set in position, filled with sand, rammed, and struck off. The assembly is rolled over and the follow board removed. A layer of sand is placed in the cavity of the shell pattern, and the core arbor pressed into the sand. Cavity is filled with sand, rammed and struck off. The other half shell pattern is located on top of its opposite in the mold and filled with sand by packing it into the open ends of the shell. The cope flask is set in position, filled with sand, rammed and struck off. At this point either of two procedures may be used.

In one the cope flask is removed and set aside. The half pattern is lifted off, and then the core is removed carefully and set on an appropriate support or stand. The other half pattern in the drag is removed, the core replaced, the cope mold put in position, and the completed mold set out on the floor.

In the second method, instead of removing the cope mold, the whole assembly is rolled over. The drag

mold is lifted off, the half pattern removed and the drag mold replaced. The assembly again is rolled over bringing the cope mold on top. Cope mold is lifted off, the half pattern removed, and the cope mold replaced. Completed mold is set out on the floor. While this method requires more steps, it eliminates lifting out the core and replacing it—an advantage worthy of consideration.

A variation of the shell pattern method was described in the December, 1946, issue of FOUNDRY by Thomas Boyd who claimed it is especially useful with operators unskilled in the foregoing practices. As indicated in Fig. 2, the shell patterns are in the form of two matchplates for use on a squeezer-type molding machine. In practice the core arbor is placed in the cavity of the drag plate, filled with sand and squeezed. Cavity in the cope plate is filled with sand and squeezed. Then the two plates are "booked" by placing the inner edges of the plates together and raising the outer edges vertically in an action similar to closing a large book.

After the plates come together vertically, they are let down in a horizontal position so that the cope plate is on top and then are set on a flask. Another flask is located on the cope plate, filled with sand and squeezed. Assembly is rolled over, the drag flask is filled with sand and squeezed. The drag mold now on top is removed, the half pattern plate lifted off, and the drag mold replaced. The assembly is rolled over, the cope mold removed, the half pattern plate lifted off, and the cope mold replaced. Complete mold then is set out on the floor.

Core arbors used in fitting production usually are formed of a backbone with projections or semicircular plates as shown in Fig. 3. This type, used for elbows, employs a wing projection to prevent the core from turning. The semicircular plates extend to about ½ in. from the edge of the core. Plates slide on the backbone, and if a little too loose are held in place by small wooden wedges. In the case of Y, T or other fittings where the one-piece arbor cannot be used, it is made in two or more pieces with simple mortise and tenon joints at the appropriate separation areas.

With reference to introducing calcium carbide and other materials into molten cast iron by the injection process, several descriptions of procedure and results have been published. They include "Calcium Carbide Injection—Is New Tool in Gray Iron Metallurgy," April, 1953 issue of FOUNDRY; and "Calcium Carbide Desulphurization by the Injection Process"; "Increasing the Carbon Content of Cast Iron by Ladle Injection" and "New High Strength Cast Irons Produced by Injection Methods," which are available in *Transactions* of the American Foundrymen's Society, Vol. 63, 1955.

Joint Seal Prevents Runouts

QUESTION From time to time we are troubled with runouts on some of our medium-sized molds and would like to know the cause and prevention.

ANSWER Your difficulty with runouts probably is due to distortion of the molds during handling which, in turn, results from lack of rigidity or stiffness in the flasks. The flasks either are too light for the work or are not suitably reinforced with bars.

Many foundries insure against the possibility of runouts by using a seal around the joint on the mold face. The seal is commonly referred to as dough rolls, and made by rolling out clay balls between boards to form long rods or cylinders of the desired diameter, or in some cases extruded in machines designed for making extruded cores. A more satisfactory material in lengths of about 30 in., and in diameters from 3/16 to ¾ in. may be obtained from several sources. Made of resin, asbestos fibers and other materials, the sealer is claimed to leave little or no residue.

Sand Condition Causes Defect

QUESTION We are forwarding a portion of a door panel which is to be enameled, and the pinholes, of course, result in a defective coating. Pinholes occur in both cope and drag in line with the gates. Are these the result of a sand or iron condition? We use No. 1½ Albany sand and our cupola charges are one-third each of cupola cast scrap, return or home scrap and pig iron.

ANSWER It appears to us that the pinholes on the cope and drag surfaces are caused by the sand being on the wet side, although there are some indications of broken edges resulting in some sand wash. Possibly the broken edges may occur before closing the mold, and the little sand wash indications are due to the molder failing to blow out the cavity. The pinholes also may result from the sand being on the tight side and preventing ready escape of the steam.

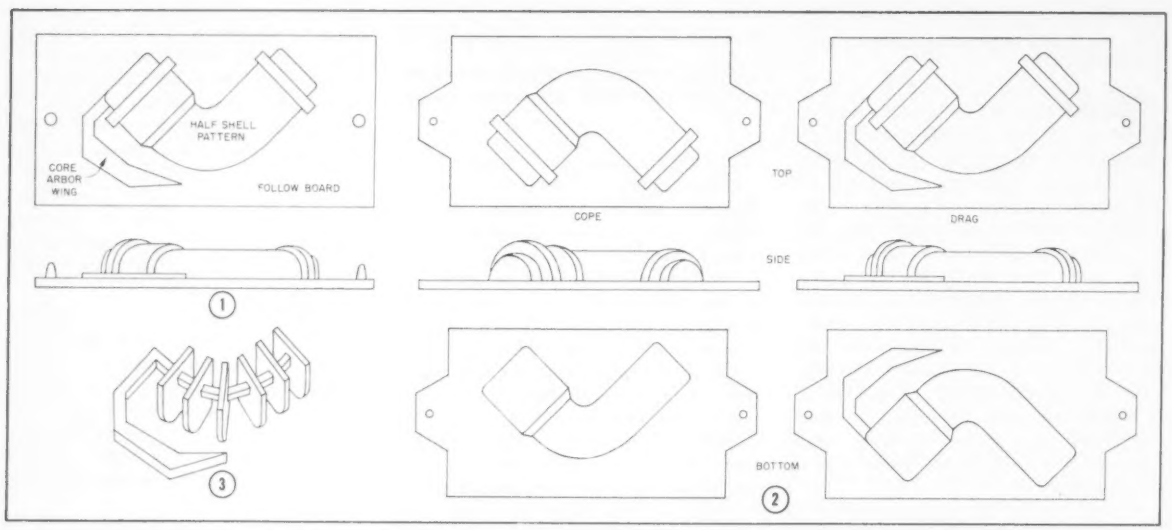


Fig. 1—Shell pattern for soil pipe fitting is set on a follow board, hollow side down. Fig. 2—Views of cope and drag shell-type matchplates for same application. Fig. 3—Sketch of core arbor for elbow

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. . . Baker-Raulang Co. pres.

● E. CLAUDE JETER
. . . NEO chapter chairman

● R. C. STOKES
. . . joins Crown Non-Ferrous

CHARLES D. PREUSCH, formerly foundry metallurgist, Crucible Steel Co. of America, Harrison, N. J., was appointed chief metallurgist there. Since he joined the company in 1940, Mr. Preusch served as a metallurgist in the research and metallurgical laboratories and the melting department in Harrison. He was chairman of the Metropolitan Chapter of the AFS in 1955-56.

John F. Woodell, formerly quality control engineer, Hansell-Elcock Co., Chicago, was named plant superintendent, Sheffield Foundry Co., Chicago. **Richard E. Marks,** who has been acting superintendent at Sheffield Foundry, was appointed sales manager.

Chester L. Mack recently joined Johnson Bronze Co., New Castle, Pa., as foundry foreman. Since 1945 he was foreman, Chautauqua Hardware Corp., Jamestown, N. Y. Mr. Mack is active in committee work of the AFS Brass and Bronze Division.

James H. Joyner was named general manager, Pioneer Works, Quaker Rubber Division, H. K. Porter Co., Philadelphia. With the division since 1950, Mr. Joyner was formerly manager of sales in ten western states for its Pioneer Rubber Mills.

Henry Present was appointed director of engineering and metallurgy, Jelrus Precision Casting Corp., New York. Previous connections include Crucible Steel Co. of America, Pittsburgh, and Arwood Precision Casting Corp., Brooklyn, N. Y.

● **Eugene Caldwell,** formerly vice president-general manager, Hyster Co., Portland, Oreg., was elected president, Baker-Raulang Co., Cleveland. Mr. Caldwell succeeds **Percy L. Douglas,** who continues as a director of Baker-Raulang and executive vice president of Otis Elevator Co., New York, the parent company.

● **E. Claude Jeter,** elected chairman of the Northeastern Chapter of the AFS for 1957-58, is manager of the Cleveland Foundry, Ford Motor Co., Berea, O. Mr. Jeter joined the company in 1928, after graduation from Clemson College, and was engaged in analytical laboratory and experimental work until 1944, when he took charge of foundry control under the chemical and metallurgical department. In 1946 he was transferred to the Rouge Production Foundry, now the Dearborn Iron Foundry, and became superintendent and plant manager there. In 1950 he was named manager of the new production foundry, then under construction in Berea.

Edgar W. Sniffen was appointed western district sales representative, Molybdenum Corp. of America, Pittsburgh, with headquarters in Chicago. **William G. Wilson,** in charge of the western district sales office in Chicago for two years, has been transferred to Pittsburgh as assistant to the manager of sales.

J. K. Norris has been elected president and a director, Central Foundry Co., Newark, N.J. Until 1956 Mr. Norris was chairman, Utica Drop Forge & Tool Corp., Utica, N.Y.

● **R. C. Stokes,** formerly plant manager, Philadelphia Bronze & Brass Co., Philadelphia, was named general manager, Crown Non-Ferrous Foundry Inc., Chester, Pa.

George W. Gutekunst, C. H. Rieman and **Brice D. Maddox** were elected vice presidents, Gardner-Denver Co., Quincy, Ill. Mr. Gutekunst is the company's general sales manager, Mr. Rieman is general manager of the Denver plant, and Mr. Maddox is general manager of the Keller Tool Division, Grand Haven, Mich.

Eugene L. Miller was named president, Cooper-Bessemer Corp., Mt. Vernon, O., continuing as general manager, a position he has held for the past year and a half. **L. F. Williams,** former president, has become board chairman of the company. Mr. Miller was project engineer for Cooper-Bessemer from 1946 until 1954, when he was named assistant general manager.

Harry E. Kellogg, vice president and former treasurer, Link-Belt Co., Chicago, recently retired, after 40 years of service. He will continue as a director of the company.

M. C. Reed was elected president, Dunkirk Radiator Corp., Dunkirk, N. Y., succeeding the late L. N. Murray. Mr. Reed was formerly vice president-sales.

Walter H. Kraus has been appointed assistant sales manager, West Steel Casting Co., Cleveland, the position previously held by **Seaver C. Kenyon,** who has retired. Prior to

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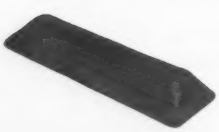

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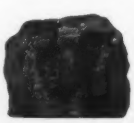

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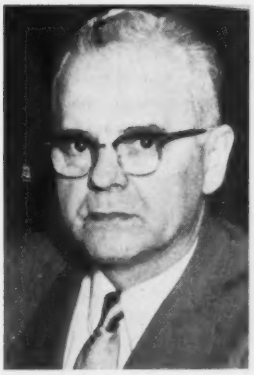


HUGH K. STEVENSON

Cooper-Bessemer appointments

● GRAHAM BARTON

● ERNEST R. MEYERS

Michigan Oven sales appointments

joining the company two years ago, Mr. Kraus was associated with Lake City Malleable Co., Cleveland.

● **Willard A. Luli** was named works manager, and **Hugh K. Stevenson,** assistant works manager, Cooper-Bessemer Corp., Grove City, Pa. **Carl H. Vaupel,** former works manager, has resigned. Mr. Luli joined Cooper-Bessemer in 1938, served in the engineering, production and sales departments, and in recent years assisted in management of the Grove City plant. Mr. Stevenson, with the company since 1939, was formerly general superintendent there.

Donald H. Teetor was named chairman of the board, Perfect Circle Corp., Hagerstown, Ind., succeeding **Lothair Teetor,** who will continue as a director of the company. **William B. Prosser** has been elected president, continuing as board chairman of Perfect Circle Co. Ltd., Toronto, Ont., and Centrifugal Foundry Co., Muskegon, Mich., subsidiaries of Perfect Circle. He became a vice president in 1951. **Ralph R. Teetor,** who became president in 1946, remains a director, and will devote his attention to new product development. **Herman C. Teetor,** since 1946 director of the company's advertising, succeeds Donald H. Teetor as a vice president.

Harry M. Pier was appointed executive secretary, Air Pollution Control Association, Pittsburgh, succeeding **Harry C. Ballman.** Mr. Pier was formerly with Research Corp., New York, and its subsidiary, Research-Cottrell Inc., Bound Brook, N. J.

Edwin W. Burne was appointed manager of the Employee and Plant Community Relations Section of General Electric Co.'s Foundry Department, Schenectady, N. Y. He has been with the company since 1944.

William D. Gates has joined Laclede-Christy Division, H. K. Porter Co., St. Louis, as sales representative in western West Virginia and southeast Ohio, with headquarters in Pittsburgh. Formerly sales representative, Frazier - Simplex Inc., Washington, Pa., he was previously associated with Bethlehem Steel Co., Johnstown, Pa.

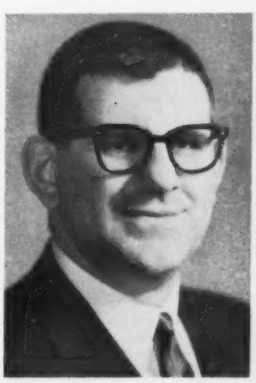
James A. Lind was named vice president-finance, and **John F. Corkery,** vice president - public relations, Thor Power Tool Co., Chicago. Mr. Lind, with the company since 1937, will continue as treasurer, a position he has held since 1942. Mr. Corkery joined Thor in 1942, and served in sales promotion and later as manager of the electric tool division. He returned to sales promotion in 1954.

A. F. Sprankle, until recently director of metallurgy and assistant to the president, Northeastern Steel Corp., Bridgeport, Conn., was named technical director and assistant vice president, Vanadium Corp. of America, New York, at the research center in Cambridge, O.

● **Ernest R. Meyers** was named assistant sales manager, Michigan Oven Co., Detroit. **Graham Barton** was made Michigan engineering sales representative for the company. For the past 10 years Mr. Meyers was engaged in sales and engineering work with Newcomb-Detroit Co., Detroit. Mr. Barton was senior draftsman, erection superintendent and service engineer for Michigan Oven until 1955, when he was appointed supervisor of engineering, Walsh Metal Products Inc., a company subsidiary.

John W. Coffey recently joined the Foundry Division, Hansell-Elcock Co., Chicago, as chief metallurgist. For the last 18 years he was with Gunite Foundries Corp., Rockford, Ill., as sand laboratory director, and more recently as metallurgist.

● **Robert L. Snook,** was appointed southwestern district manager, Industrial Products Department, Magnet Cove Barium Corp., Houston, Tex. **Gerry Morrical** becomes midwestern district manager. They were formerly sales representatives. **H. M. Gwyn Jr.,** formerly associated with Minerals &



● GERRY MORRICAL

● H. M. GWYN JR.

● ROBERT L. SNOOK

Magnet Cove Barium district mgrs.

not twice...

not three times...

BUT OVER FIVE TIMES

THE PRODUCTION

and better quality too!

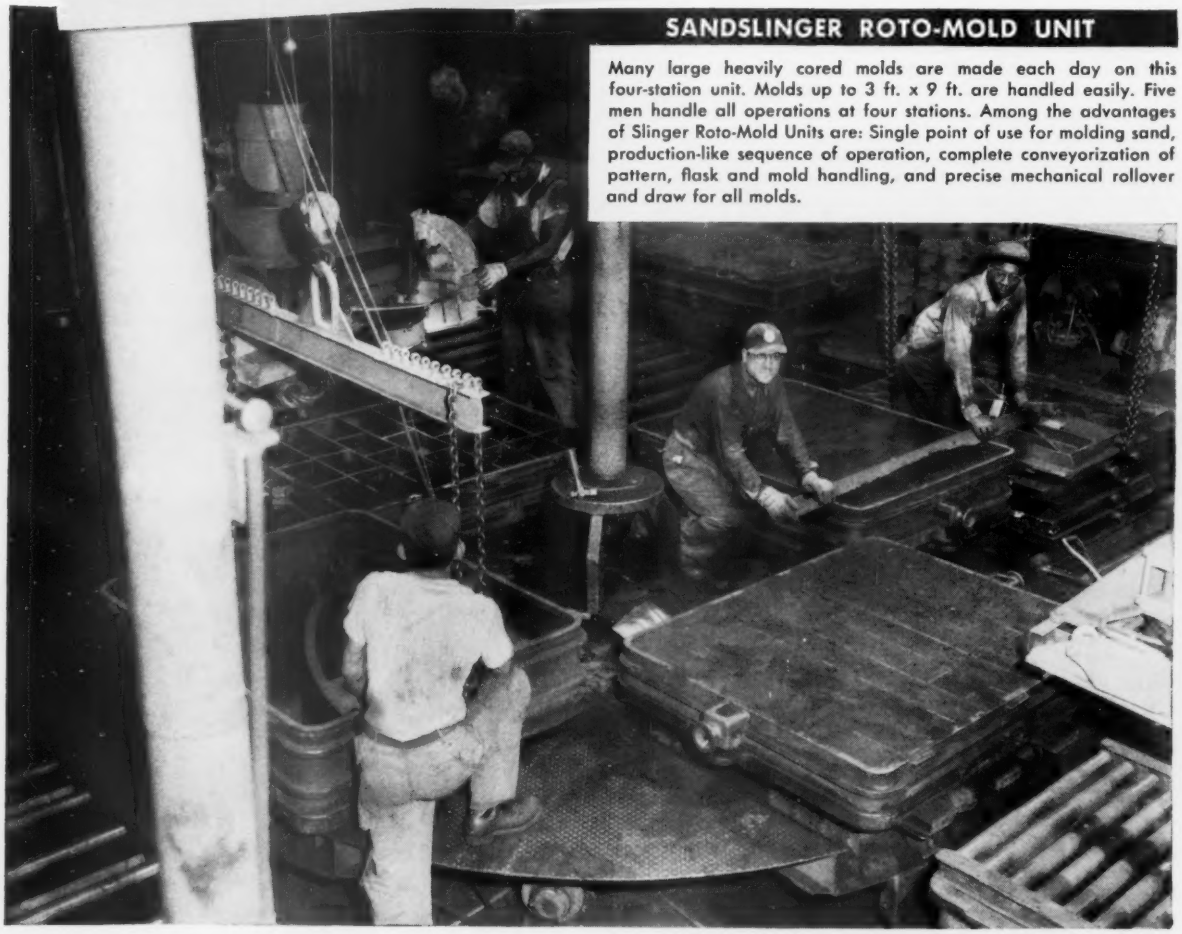
THE AMERICAN MFG. CO. OF TEXAS AT FORT WORTH, manufacturer of an outstanding line of oil field equipment, have recently increased the production of their gray iron foundry by over 500 per cent in virtually the same foundry area. They have done the job by applying production methods to their jobbing work. Their larger castings — weighing from 200 lbs. to a ton — are poured in molds produced on a new Slinger Roto-Mold Unit. This four-station unit permits the foundry to gain all of the production and quality advantages of production methods, while retaining the flexibility which is essential for their work. Fifty different jobs are regularly handled on the unit and six or eight pattern changes are made each day.

Sand for this operation, as well as for all other molding in the foundry, is fully mulled by a Model "60" Speedmullor. This single mullor thoroughly prepares over 200 tons of closely controlled synthetic sand each day. The mullor, equipped with Speedmullor Cooling and Mulltrolmatic Automatic Controls, delivers a fully aerated, cool, fluffy, flowable molding sand for the foundry's molding operations. Slinger ramming and Speedmullor mulling are primarily responsible for the fivefold increased production with increased quality at this recently modernized foundry.

Send for your copy of the BETTER METHODS story featuring the American Mfg. Co. of Texas. Beardsley & Piper, Div. Pettibone Mulliken Corp., 2424 N. Cicero Avenue, Chicago 39, Illinois.

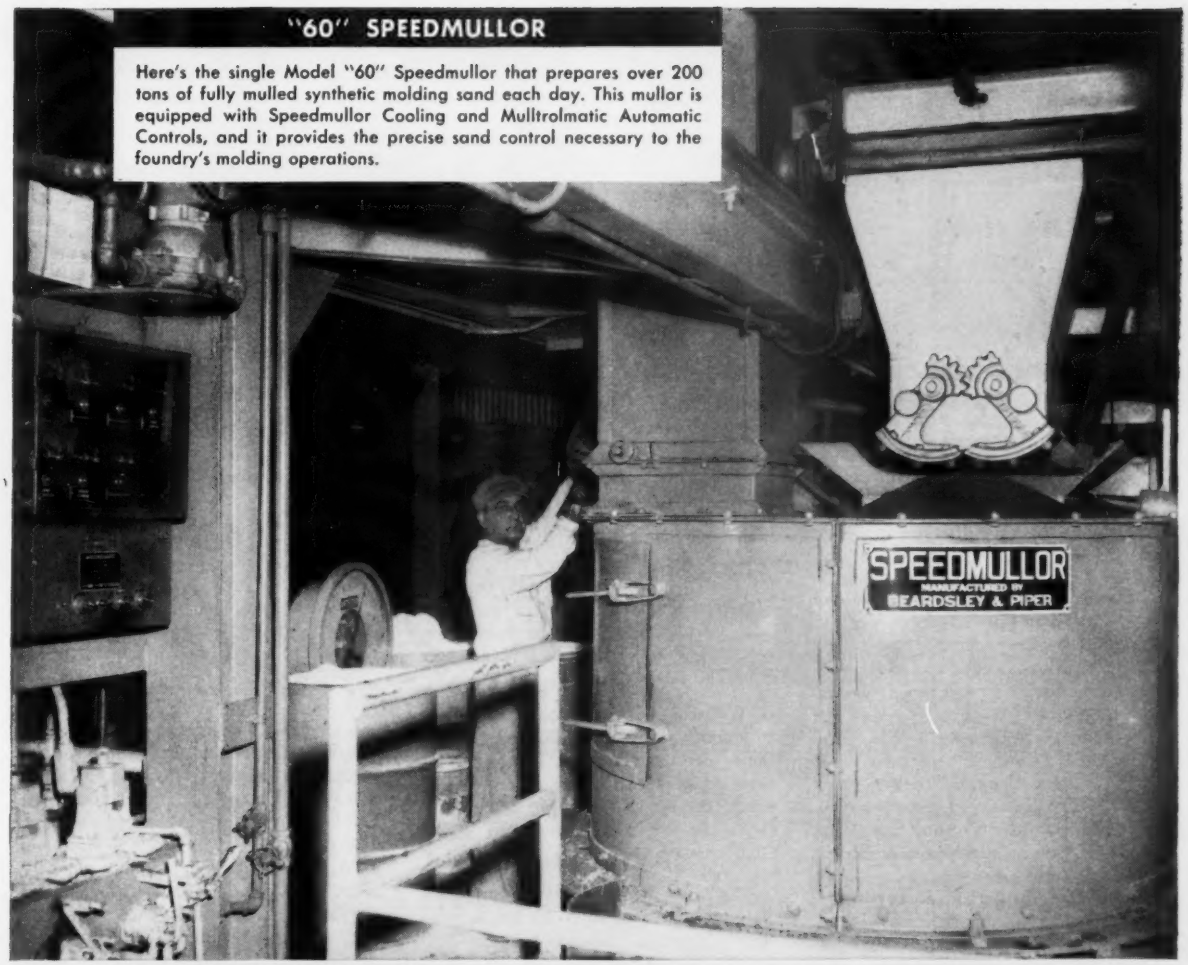
SANDSLINGER ROTO-MOLD UNIT

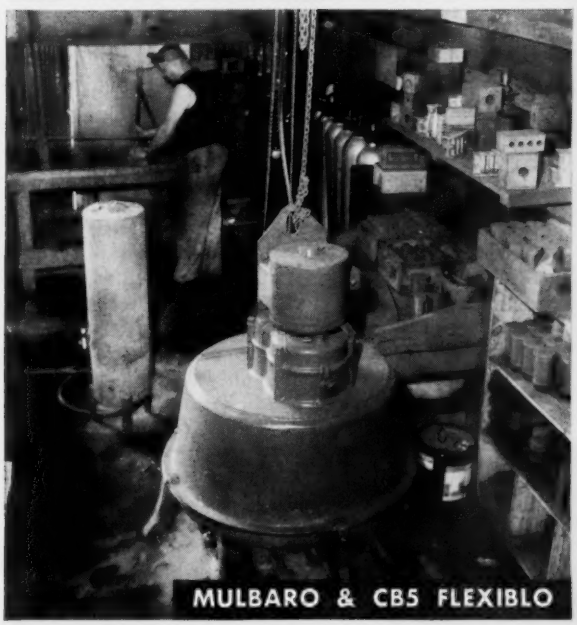
Many large heavily cored molds are made each day on this four-station unit. Molds up to 3 ft. x 9 ft. are handled easily. Five men handle all operations at four stations. Among the advantages of Slinger Roto-Mold Units are: Single point of use for molding sand, production-like sequence of operation, complete conveyorization of pattern, flask and mold handling, and precise mechanical rollover and draw for all molds.



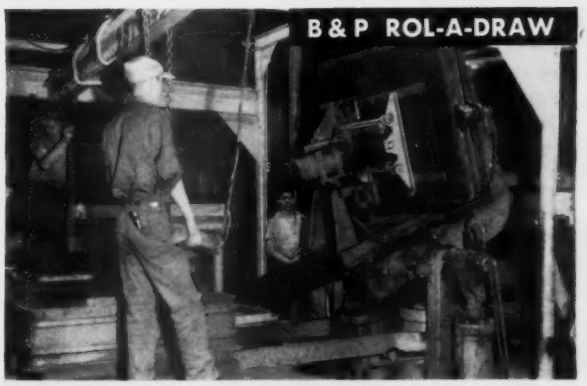
"60" SPEEDMULLOR

Here's the single Model "60" Speedmullor that prepares over 200 tons of fully mulled synthetic molding sand each day. This mullor is equipped with Speedmullor Cooling and Mulltrolmatic Automatic Controls, and it provides the precise sand control necessary to the foundry's molding operations.

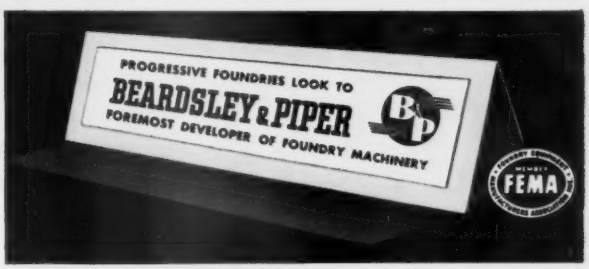




This B & P Model 3½ Mulbaro, formerly used to mull facing sand is now used to accurately and thoroughly mull a special CO^2 core sand mixture. The CO^2 sand is used in a CB5 Flexiblo Coreblower, seen in the background.

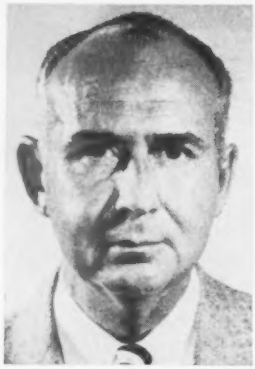


This 1020 RCX Rol-A-Draw rated at 3,000 lbs. capacity handles over 4,000 lbs. on some of the big Slinger Roto-Mold jobs. The machine provides a precise mechanical draw with a very fast cycle.



MEN OF INDUSTRY

● MAX B. MORDEN
. . . becomes sales v. p.



○ E. EUGENE OLSON
. . . becomes sales director

○ WILLARD C. SUTTLES
. . . Beardsley & Piper sales

○ ROBERT D. JOHNSON
. . . Marietta Concrete v. p.

Chemicals Corp., Philadelphia, will manage the eastern district for the company.

● **Max B. Morden** has been appointed vice president in charge of sales, Commercial Contracting Corp., Detroit. He joined the company as a sales representative, and recently was sales manager.

Charles J. Booth, for the past year plant manager, Deemer Steel Casting Co., New Castle, Del., has been elected vice president of the company. He joined the company 5 years ago.

● **John B. Girdler** was appointed commercial vice president-sales, a new position at Vanadium Corp. of America, New York. Engaged in sales positions with Vanadium since 1935, last year he was named assistant vice president-general manager of sales. **Lloyd W. Lewis** was made sales manager, eastern district, and **William J. Killian,** assistant manager of the Pittsburgh district. **John J. Green,** service engineer, was appointed manager, wrought steel service, a new post.

○ **E. Eugene Olson** was appointed sales director, Shallway International Corp., Palo Alto, Calif., where he will co-ordinate activities between the company and its European office. Mr. Olson was formerly associated with Frazar & Hansen, San Francisco exporters.

○ **Willard C. Suttles** has joined Beardsley & Piper Division, Pettibone Mulliken Corp., Chicago, as sales representative in parts of Michigan, Ohio and Kentucky. Until recently he was associated with Hill & Griffith Co., Cincinnati.

Roger R. Reynolds was appointed district sales manager in Texas, Oklahoma, and Louisiana, for the Materials Handling Division, Yale & Towne Mfg. Co., Philadelphia. He joined the company in 1947. **L. Patrick McGauley** was named sales representative for the division in charge of a second district office recently opened in New Orleans. **William H. McManus,** since 1941 hoist sales executive for the division, succeeds Mr. Reynolds as New England hoist district sales manager in Boston.

● JOHN B. GIRDLER

● LLOYD W. LEWIS

● WILLIAM J. KILLIAN

Vanadium Corp. sales appointments

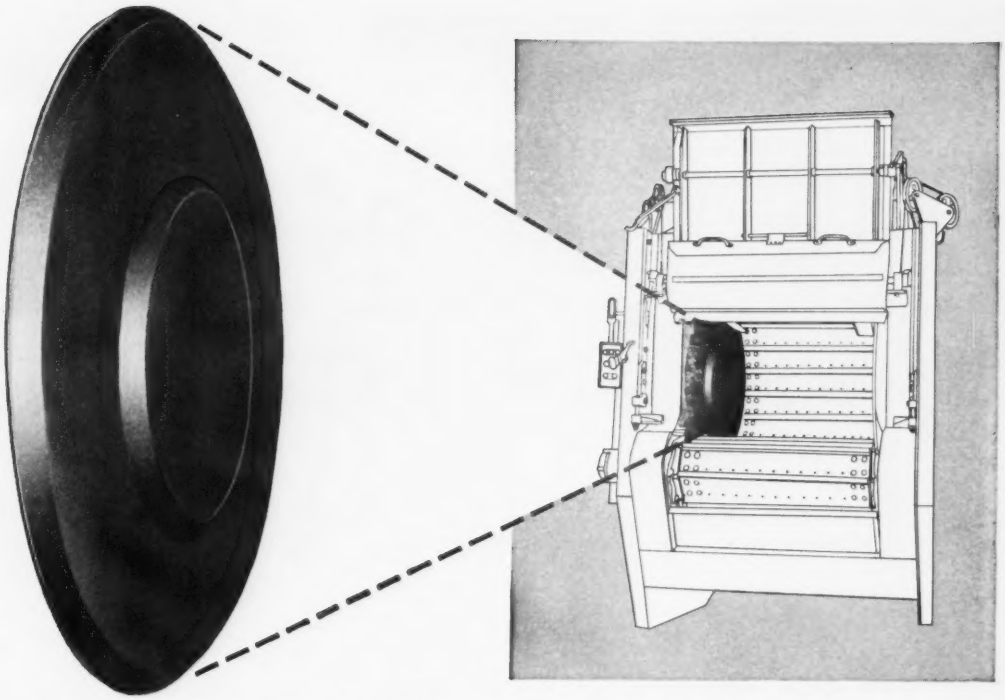
○ **Robert D. Johnson,** recently assistant to the executive vice president, Marietta Concrete Corp., Marietta, O., was appointed vice president in charge of engineered product sales. With the company since 1950, previously he was general manager of the Nashville, Tenn., plant.

Carroll C. Parker was appointed manager of grinding wheel sales, mechanical goods division, United States Rubber Co., New York, with headquarters at the company's Fort Wayne, Ind., plant. He succeeds **J. A. Fairfield,** who retired recently after 26 years of service. Mr. Parker joined the company in 1937 and in 1946 was transferred from production to the sales staff, becoming assistant manager of grinding wheels sales in 1952.

E. M. Richardson was appointed general sales manager, Refractories Division, H. K. Porter Co., New York, recently established to combine management of the company's former Laclede-Christy Division, St. Louis, McLain Fire Brick Division, Pittsburgh, and Mullite Refractories Division, Shelton, Conn. Mr. Richardson was formerly a management consultant in Philadelphia.

J. S. Morgan was appointed director of domestic sales, Industries Group, Allis-Chalmers Mfg. Co., Milwaukee. He joined the company after graduation from Purdue University in 1935, and for the last 3 years was director of utility sales for the Industries Group.

T. W. R. Latham was appointed Los Angeles district manager, Raybestos-Manhattan Inc., Passaic, N. J. **S. V. V. Hoffman,** who was acting as district manager in Los Angeles, continues as manager of the western



Two good reasons why it pays to install Gates rubber-faced end-liners

1 **Shot breakage is reduced as much as 50%.**

2 **Centers are replaceable . . . end-liners last *far longer*.**

Savings of hundreds of dollars annually in shot replacements are reported by users of Gates Rubber-Faced End-Liners (Shot Blast Discs).

And Gates Rubber-Faced End-Liners endure . . . last *far longer* . . . because their centers, which must bear the brunt of the wear, can be renewed two or three times during the normal life of the main disc.

Gates Rubber-Faced End-Liners are made in two types — center patch and hollow center — both of which are equipped with replaceable centers.

For complete data on sizes and prices, consult any of the Gates authorized distributors listed below — or write direct to the Gates Rubber Company Sales Division, Inc., Denver, Colorado.

HOLLOW CENTER DISC WITH PATCH PLATE

Center disc is recessed flush in hollow center of main disc. Center can be replaced without replacing entire end-liner.

SOLID DISC WITH CENTER PATCH

Both discs easily bolted to main structure of shot blast machine.

Wiley Hughes Supply Co.
New York Ave. & Spruce St., Trenton, N.J.

Western Rubber Products Co.
320 So. Grand Ave., St. Louis, Mo.

Baker Warren
80 - 26th St., Pittsburgh, Pa.

J. H. Nelson
8200 Vincennes St., Chicago, Ill.

Owen-Richards Co., Inc.
824 - 31st St., No., Birmingham, Ala.

Rubber Faced Steel Plate, Inc.
28400 Grand River, Farmington, Mich.

Philadelphia Steel Abrasives Co.
Modena, Coatesville, Pennsylvania

Gates The Mark of *Specialized* Research

TPA201

Gates Rubber-Faced Shot Blast Discs

MEN OF INDUSTRY

● JOHN BORMAN

● PHILLIP E. CAMPBELL

Clark Equipment sales mgrs.

● HAYWARD A. GAY

● PHILIP O. GEIER JR.

Cincinnati Milling Machine managers

region. **J. M. Ehman** was named assistant district manager in Birmingham. **Nevin L. Rush** was made manager of distributor sales, Philadelphia, and **Julian P. Chilcote,** sales representative in the New York district.

● **Phillip E. Campbell** was appointed sales manager of the gas truck section, and **John Borman,** sales manager of the attachments section, Industrial Truck Division, Clark Equipment Co., Battle Creek, Mich. Mr. Campbell has been with Clark for 15 years, recently as south-central district manager. Since he joined the company in 1953, Mr. Borman was assistant to the vice president.

● **Albert H. Foster** has been named vice president and director of the New York office, Lester B. Knight & Associates Inc. Mr. Foster recently resigned as president, Mead Carney & Co., and vice president and director, First Research Corp., both of New York.

● **W. Gerald Lanterman,** formerly Cleveland regional manager, Lamson Corp., Syracuse, N.Y., was named manager of sales for its industrial division. For 15 years he was the company's district manager in Philadelphia.

William J. Reddington was appointed St. Louis district sales manager for the mechanical goods division, United States Rubber Co., New York, succeeding **Hugh Reynolds,** who retired recently after 30 years with the company. Mr. Reddington joined the company in 1933 and was a member of the mechanical goods sales staff since 1937.

Dr. Albert Muller, until recently director of metallurgical research, Air Reduction Central Research Laboratories, Murray Hill, N. J., was appointed assistant to the president, Air Reduction Sales Co., division of Air Reduction Co., New York.

● **Oliver M. Hopkins** recently joined John Morrell Mfg. Co., Elgin, Ill., as sales manager. He attended Aviation Institute of Engineering and University of Wichita and his background covers both technical and sales experience.

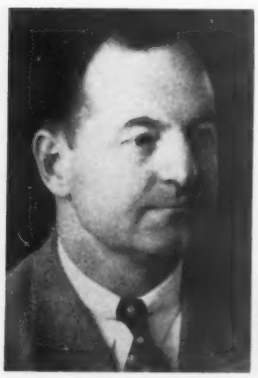
● **Hayward A. Gay** was named manager of the Machine Tool Division, and **Philip O. Geier Jr.,** manager of the Products Division, Cincinnati Milling Machine Co., Cincinnati. **Swan E. Bergstrom,** executive vice president, has been acting manager of the Machine Tool Division. Mr. Gay, a company vice president, was formerly manager, and Mr. Geier, assistant manager, of the Products Division.

Thomas W. Russell Jr. was elected vice president, American Brake Shoe Co., New York. A graduate of Yale University, he joined the company in 1945 and became a purchasing buyer in 1949. **Frank B. Newbert,** formerly assistant general purchasing agent, has succeeded Mr. Russell as general purchasing agent. Mr. Newbert has been associated with Brake Shoe since 1934.

Richard A. Szara has been appointed northern Illinois and Minnesota sales representative, Foundry Products Division, Archer-Daniels-Midland Co., Cleveland. He replaces **J. L. Meckel,** who continues as representative in Indiana, and **E. L. Shaughnessy,** who continues as representative in Wisconsin and upper Michigan. Mr. Szara was formerly associated with Plamondon Magnetic Co., Howard Foundry Co., and Crane Co., all of Chicago.

William M. Bailey was elected chairman of the board of directors, William M. Bailey Co., Pittsburgh. **Eugene M. Neely** succeeds Mr. Bailey as president, and **J. Russell Miller** was named manager of sales, Mr. Neely's former position.

Norman C. Peskin and **Charles Freundlich** were appointed New England sales engineers, Electronics and Instrumentation Division, Baldwin-



● ALBERT H. FOSTER

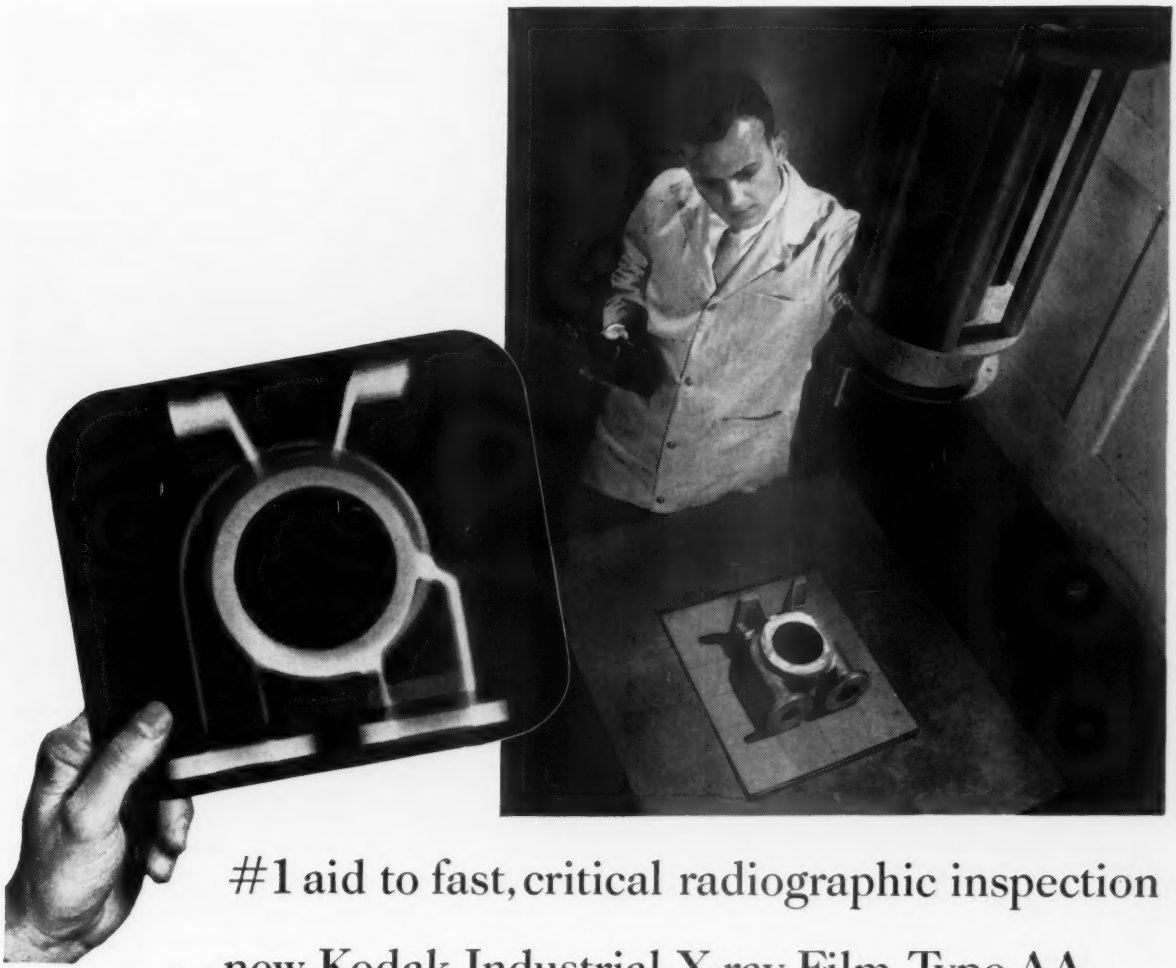
. . . joins Lester B. Knight

● W. GERALD LANTERMAN

. . . division sales mgr.

OLIVER M. HOPKINS

. . . manager of sales



#1 aid to fast, critical radiographic inspection

...new Kodak Industrial X-ray Film, Type AA

TODAY'S radiographic inspections call for increased sensitivity, greater speed. And these are the characteristics of Kodak's newest industrial x-ray film, Kodak Industrial X-ray Film, Type AA.

This film retains all the excellent qualities that made Kodak Type A the most widely used x-ray film in industry. Then, in addition, it provides greatly increased speed.

This permits exposure time to be cut as much as 50%. It allows adjustment of the radiographic factors to obtain greater contrast and easier readability.

Kodak X-ray Film, Type AA can multiply your minutes—can extend the usefulness of your present radiographic equipment.

Find out all the ways it can improve your production. Get in touch with your x-ray dealer or Kodak Technical Representative.

EASTMAN KODAK COMPANY
X-ray Division Rochester 4, N. Y.

Read what the new Kodak Industrial X-ray Film, Type AA, does for you:

- Reduces exposure time—speeds up routine examinations.
- Provides increased radiographic sensitivity through higher densities with established exposure and processing technics.
- Gives greater subject contrast, more detail and easier readability when established exposure times are used with reduced kilovoltage.
- Shortens processing cycle with existing exposure technics.
- Reduces the possibility of pressure desensitization under the usual shop conditions of use.

Kodak

Kodak Industrial X-ray Film, Type AA and Type M is now available in 100-sheet boxes wrapped without interleaving paper. Designated as AA-100; M-100.

MEN OF INDUSTRY

● HENRY R. MERRILL
. . . Behr-Manning v. p.

● OSBORNE J. STOUDT
. . . becomes branch mgr.

● JOHN E. TAYLOR
. . . abrasive sales, Norton

● MYLES A. SNYDER
. . . Norton sales, Chicago

Lima-Hamilton Corp., Philadelphia. They were formerly application engineers for the company. Mr. Peskin will handle sales of SR-4 devices and systems and Mr. Freundlich will represent the division in the sale of testing machines.

● **Henry R. Merrill** was appointed vice president-sales, Behr-Manning Co., Troy, N. Y., division of Norton Co., Worcester, Mass. A graduate of Yale University, he joined the company in 1930 and rose through various sales assignments until 1955 when he became general sales manager. Mr. Merrill is a director of the American branch of the company and its affiliate, Behr-Manning (Canada) Ltd.

Robert L. Brown was named sales manager of gasoline and gas-powered industrial trucks, Materials Handling Division, Yale & Towne Mfg. Co., Philadelphia. A graduate of Drexel Institute of Technology, he joined the company's New York branch in 1953. **Charles E. Howard** has succeeded Mr. Brown as sales manager for electric-powered trucks and truck attachments. Also a graduate of Drexel, Mr. Howard has been in the materials handling field with Yale for more than 15 years.

M. Nielsen has been elected president, Babcock & Wilcox Co., New York, succeeding **Alfred Iddles,** who has retired after 7 years as president. Mr. Nielsen, who joined the company in 1924, was executive vice president the last two years.

John R. Welsh, formerly purchasing agent for ferrous materials, American Brake Shoe Co., New York, was appointed assistant general purchasing agent. He joined the company in 1946.

● **Osborne J. Stoudt** was appointed manager of the Oakland, Calif., branch office, Brumley-Donaldson Co. He joined the company in 1946. **Austin S. Joy** was named manager of the Tube and Steel Division, with headquarters at the company's home office in Huntington Park, Calif.

William R. Tise has been appointed Western belting engineer for the conveyor and elevator belting department, United States Rubber Co. He will work out of the Los Angeles sales office.

Frank N. Capparelli and **James A. Belanger** have been appointed factory representatives for Chicago Rubber Co. They will cover Illinois and Michigan territories, respectively.

John C. Miller, president, Berlin Chapman Co., Berlin, Wis., was elected a director of the Wisconsin Manufacturers' Association at its recent annual meeting.

Fred H. Lewis has been named assistant general manager, Cylinder Gas Division, Air Products Inc., Allentown, Pa.

An Extra Copy?

Would you like an extra copy of one or more of the feature articles appearing in FOUNDRY?

As long as the supply lasts, we will be pleased to fill your requests. Make your wishes known by filling in the "Reader Information Service" card, on page 51 of this issue, or write directly to Virginia Harms, FOUNDRY, Penton Building, Cleveland 13, O.

● **Myles A. Snyder** has been transferred to Chicago as abrasive engineer, Norton Co., Worcester, Mass. With the company since 1940, he began training for sales work in 1947. **John E. Taylor** has succeeded Mr. Snyder as abrasive engineer in parts of Iowa, Nebraska and South Dakota. Mr. Taylor was formerly field engineer at the company's Cleveland district office.

William P. Snyder III was elected president, Shenango Furnace Co., Pittsburgh, succeeding his father, **William P. Snyder Jr.,** who has become chairman of the board. **John K. Foster** was named senior vice president. **B. W. Norton** and **A. L. Fairley Jr.** were elected directors of the company.

William L. Wallace was made assistant to the executive vice president, Alloy Precision Castings Co., Cleveland. Prior to joining the company in March he was styling administration manager, Ford Motor Co., Dearborn, Mich.

T. F. Flood, vice president-production, Frank G. Hough Co., Libertyville, Ill., was named a director and assumes additional duties as vice president-sales and manufacturing.

Victor L. Persbacker, controller, American Brake Shoe Co., New York, was elected assistant treasurer, Controllers Institute of America, New York, for the period starting Sept. 1.

Roger A. McIntyre was named director of sales, Horizons Inc., Cleveland. He was formerly associated with Designers for Industry, there.

T. J. Ludwa was recently promoted to assistant sales manager, Calumet Steel Castings Corp., Hammond, Ind.

WHEELABRATOR® STEEL SHOT

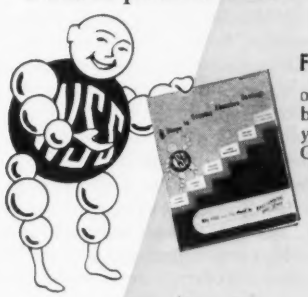
cuts abrasive costs for *ALL TYPES* of foundries

Mass Production Automotive Gray Iron Foundry *Saves $13,365 in 1 year!*

Wheelabrator Steel Shot's enviable success in solving cleaning problems is the reason why more than 1200 firms converted to this heat-treated, electric arc furnace steel shot within two years' time. Practically every conceivable cleaning problem was encountered within these plants. In every case Wheelabrator Steel Shot cut abrasive costs and provided other valuable benefits.

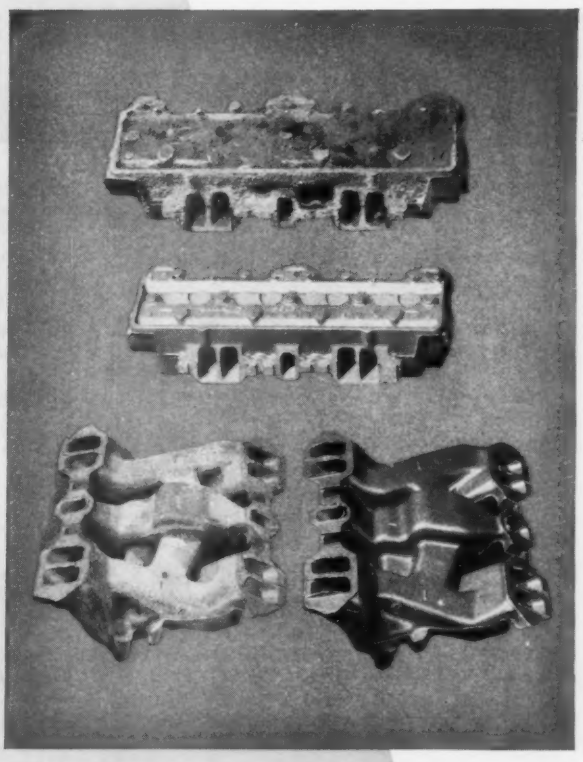
Typical of this success is the saving in abrasive cost experienced in a large, automotive gray iron foundry. By switching to Wheelabrator Steel Shot a 17.3c reduction on every ton of castings cleaned was effected. On the 309 tons of gray iron castings cleaned daily, this amounts to a daily saving of $53.46. Figuring 250 working days per year makes annual savings of $13,365, a 15.5% reduction in abrasive costs.

The resistance to breakdown, which is responsible for these savings with Wheelabrator Steel Shot, also results in a better product finish. As the cleaning room foreman points out, "Wheelabrator Steel Shot stays round longer instead of breaking down into fines. Because of this we get a better finish in a shorter period of time."



FOR MORE INFORMATION

on the many ways Wheelabrator Steel Shot can help you save, write today for Catalog 89-B.



WHEELABRATOR

CORPORATION

505 South Byrkit Street, Mishawaka, Indiana

World's Largest Manufacturer of Steel Abrasives

Main coolant valve for an atomic energy plant now under construction. This 18-in. valve is made of chrome-nickel stainless steel

VALVES for ATOMIC POWER

. . . Open New Foundry Market

By J. J. KANTER
Directing Engineer, Engineering Laboratories
Crane Co.
Chicago

MEETING the somewhat rigid quality requirements for nuclear power plant valves and fittings presents a real challenge to valvemakers. Because quality requirements differ with each reactor concept employed, they range from generally recognized power piping standards to those which present the challenge. Actually, no valve standards can be considered unique and adequate to this field.

Market Is Growing—Aware of the importance of its product to the economics of atomic power, the valve industry is eager to make the quality product needed to insure safe, dependable operation of nuclear power plants. Projections of the demand which the industry might have to meet on valves and fittings of all descriptions for nuclear plants are impressive. They show an annual total business of $25 million for 1960 which will rise to $90 million by 1963.

Seek Economy—Engineers designing nuclear plants are becoming aware of the need to keep requirements reasonable so that components can be produced economically. Much of the expense currently being built into such valves results from caution and lack of experience with the operation of the devices the valves will control. More experience, the emergence of practical systems and familiarity with production of nuclear piping should help to cut costs. Piping components eventually should use less critical materials and be designed for more economical production.

Quality requirement problems generally are most acute with "primary loop" valves, which control the flow of a primary fluid. Special attention is given to all of the possibilities of failure or malfunctioning which might result either in spreading of radioactive fluid or loss of the liquid cover of fuel elements in event of a shutdown.

Fluids contained vary with the type of reactor system involved, and each has its own problems. These fluids include pressurized, demineralized light or heavy water; wet saturated steam; liquid sodium or alloys of sodium-potassium; acid solutions of fissionable materials; liquid phenolics; or even molten bismuth or sodium containing fissionable metals and fission products.

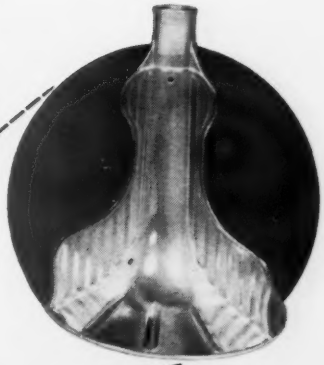
Guard Against Leakage—Sealing valve stems against leakage has received perhaps the most attention in the design and specification of primary loop valves. Systems for guarding against stem leakage use such special provisions as bellows, canopies, labyrinths of sealing rings or even frozen seals of the fluid itself (sodium, for instance).

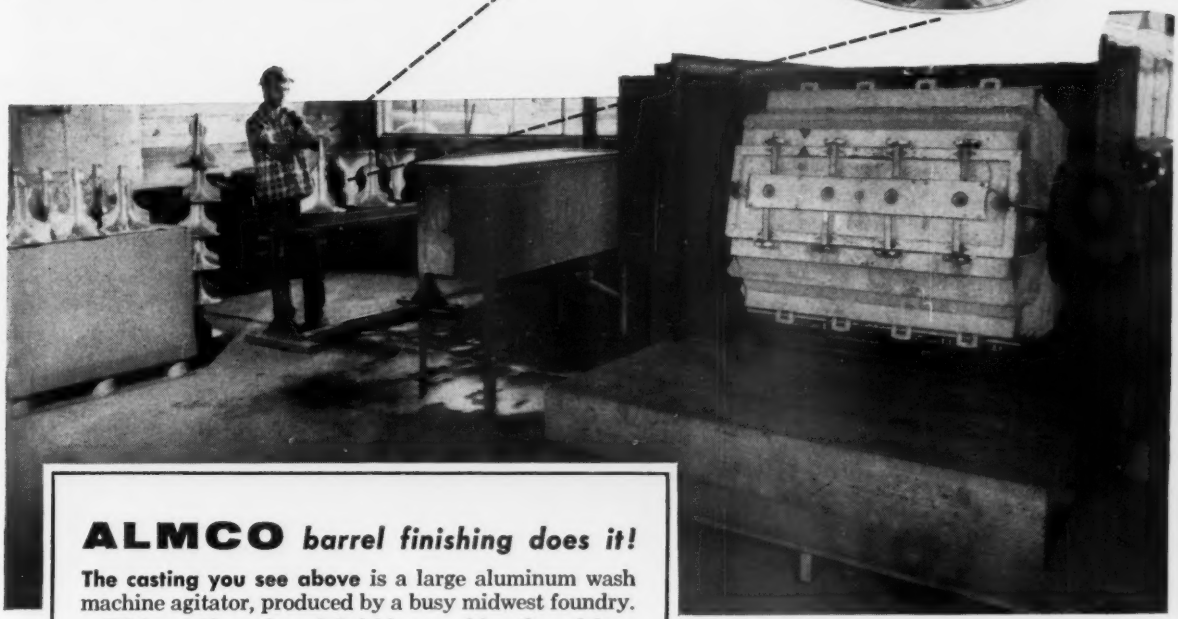
Corrosion Resistance—Primary loop piping presents a different corrosion problem in each type of reactor. Particular attention is being given to piping in water-cooled reactors since it is an important factor in the economics of reactor construction. In these reactors, radiation releases dissolved oxygen which, with decomposition products, is a factor in steel corrosion.

In liquid-sodium heat transfer systems, nickel-chromium austenitic steels are used to resist attack on the steel. Where liquid bismuth is the medium, mass transfer considerations are important, and the chromium-molybdenum ferritic steels have given the most favorable performance characteristics. Perhaps the most extreme piping corrosion problem is in aqueous homogeneous systems, where highly resistant lining materials are sought. Organic material reactors using phenolic liquids do not present a special corrosion problem in the piping, and carbon

From this foundry comes a bulletin...

You can sell more castings *by using this low-cost deburring and polishing method!*





ALMCO *barrel finishing does it!*

The casting you see above is a large aluminum wash machine agitator, produced by a busy midwest foundry.

With an Almco barrel finishing machine they *deburr and polish 48 of these castings per hour.* And the foundry's customer receives a smooth, polished casting with no rough edges, and the most beautiful high sheen you can imagine!

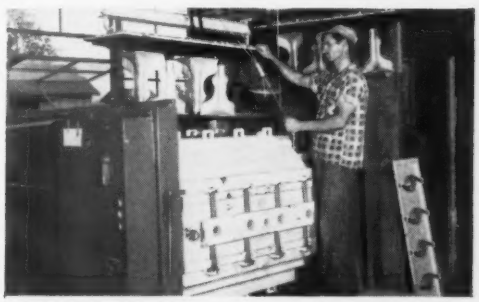
This is how many modern foundries are getting extra business—being able to deliver castings at an advanced stage of preparation for assembly.

The secret is Almco barrel finishing! In most cases, it is just too costly to attempt deburring, grinding, polishing, work-hardening, microinch finishing, etc., by hand methods or machining. But a particular Almco process, worked out exactly in the Almco lab, can provide these services at lowest possible cost, enabling you to offer "advance stage" castings at competitive prices.

Check into it! Write Almco, asking a sales engineer to call and arrange for detailed sample processing on your castings, without obligation. Or send sample parts direct to Almco, specifying results desired. Take action today!

SEND FOR THIS NEW BARREL FINISHING HANDBOOK

Complete description of the most advanced modern processes. 52 pages of facts, photos, data and cost comparison charts. Write for your personal copy today.

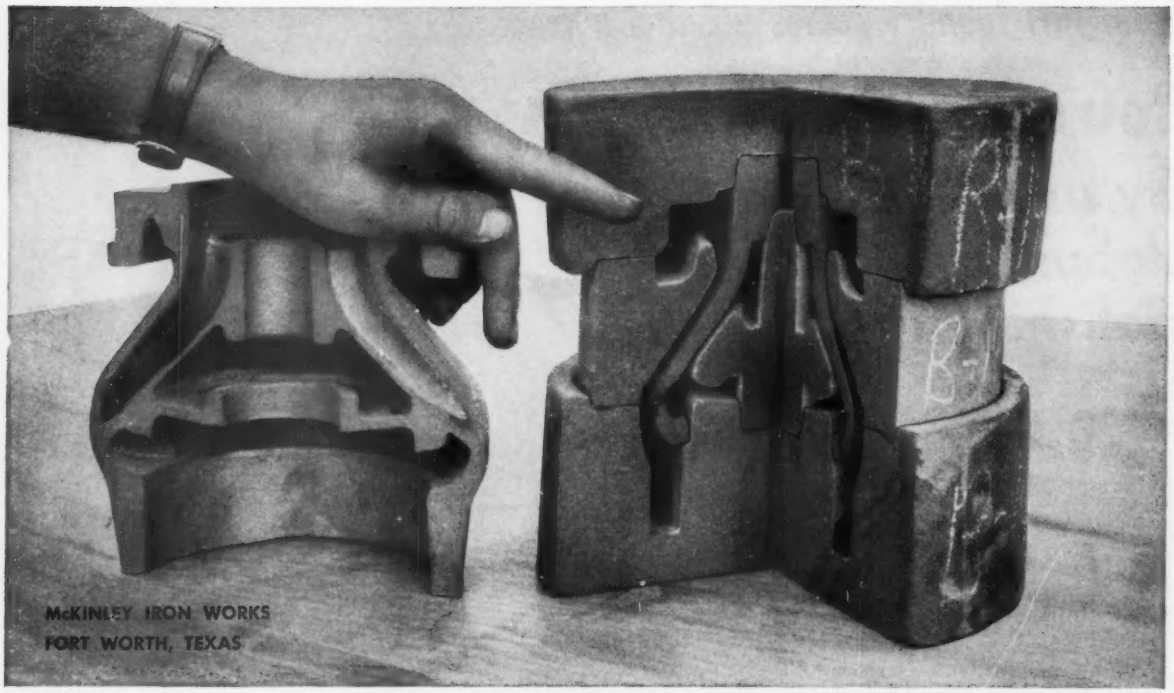


Wash machine agitators are finished by using special fixtures on the four Almco barrel doors. These hold the castings firmly while deburring and polishing action takes place. 16 agitators can be processed at once.

ALMCO

DIVISION OF QUEEN STOVE WORKS, INC.
147 Marshall Street • Albert Lea, Minn.

Sales Engineering Offices in Chicago, Detroit, Los Angeles, Newark, New Haven, Philadelphia and London, England.



Nothing's too complicated for McKinley and Cities Service Delco Core Oil!

Talk about tough cores! McKinley Iron Works once had to make one for a rod 18 feet long with a triangular cross section measuring 2 inches by 6 inches.

Another time, they produced a casting weighing 22,000 pounds . . . and every day they turn some out weighing but a few ounces.

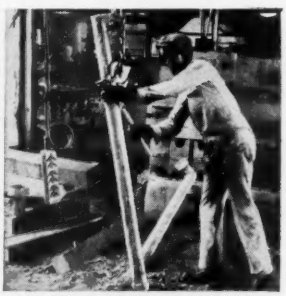
Yet, despite this tremendous diversification, McKinley manages to turn out 35 tons of castings a day, using only one core oil . . . Cities Service Delco #54.

"The reason I originally switched to Cities Service was because their lubrication engineer could give me exact specifications of their products," says President DeWitt McKinley.

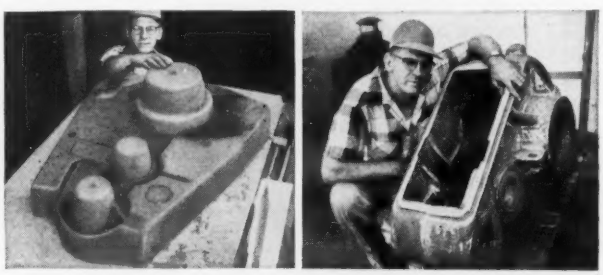
"Other companies wouldn't or couldn't do this. The Cities Service engineer not only explained the makeup of the various Cities Service oils, but worked closely with me to fulfill my exact needs.

"The result was the selection of Delco #54 for all cores, a choice which has eliminated any chance of error among our employees and thus saved considerable time and money."

Like Mr. McKinley, you'll find a Cities Service Lubrication Engineer is ready and willing to help you find the precise type of core oil suited to your foundry operation. Call him in for a talk. Or write: Cities Service Oil Company, 20 North Wacker Drive, Chicago 6, Illinois.



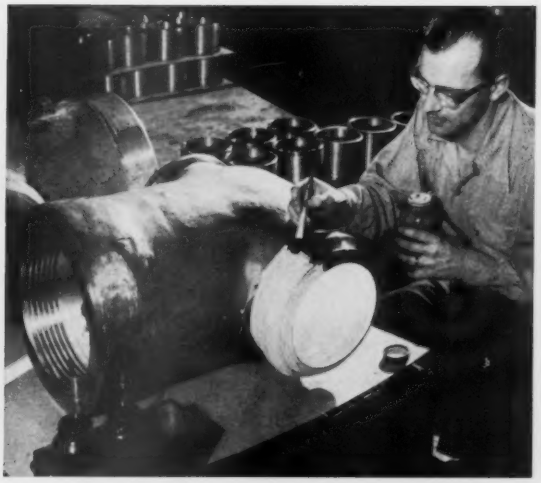
Getting the Shakedown, McKinley casting has core sand removed. Cores always have good collapsibility, thanks to Cities Service Delco #54 Core Oil.



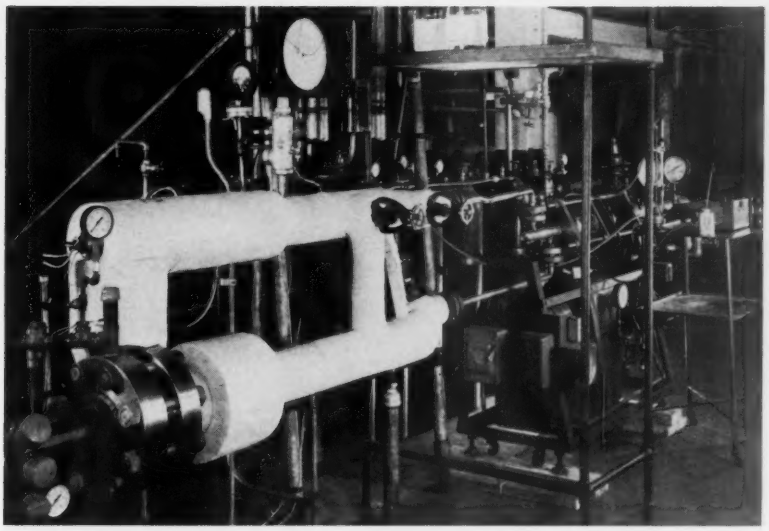
Big Core, Big Casting strike interesting contrast with smaller core and casting in picture at top. McKinley has made castings ranging from a few ounces to 22,000 pounds, using one core oil . . . Cities Service Delco #54!

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS



Illustrations above and at right show various types of inspection used on valves for atomic power plants. Above, left, cobalt 60 inspection of a large steel valve casting. Top right, dye penetrant testing used on nonmagnetic stainless steel castings. Right, magnetic particle test



High pressure and temperature water test loop which is employed for performance studies on atomic power plant valve components

steel seems to be satisfactory for them.

In the water-cooled reactors, austenitic nickel-chromium types 347, 304 and 316 are being used. Since welded construction is a must in reactor piping, the basis for choosing between them is in large measure the nature of their welding characteristics. Prototypes of reactors using carbon steel components in the primary loop system are under study, and some basis for the use of ferritic steel, ranging from plain carbon to the various chromium-molybdenum types, probably will be found.

Vital Components—Body, bonnet and disc components of primary loop valves must be of high quality since those valves are needed to isolate the reactor and retain its fluid cover. Because of their critical function, much attention has been given by reactor plant designers to the various methods by which they can be fabricated. Where large valves are required, steel castings are perhaps the most economical choice and are widely and successfully used. Forgings have been procured at considerable expense for large valves in certain of the more critical and exacting installations, but reactor designers have agreed that steel castings are satisfactory and on numerous counts superior.

Causes of Failure—Fear of failure of steel valve parts seems to stem mainly from concern over the possible damaging influence of thermal cycling and shock. Any kind of "stress raiser" thus may be suspect. In this category would be forgings containing flakes, castings with hot tears, heat-affected weld zones with microfissures, weldments with incomplete penetration, designs with sharp changes in section or other sources of stress concentration.

Use of good inspection methods on castings can serve to determine and locate undesirable discontinuities, voids and inclusions. Once any of these has been located by the various means available—such as x-rays, gamma rays, magnetic particle inspection, fluorescent oils, dye stains or ultrasonics—it is a matter of engineering judgment to decide whether a given indication warrants removal and weld repair.

Requirements for Surfaces—Valve

OSBORN ROTA-LIFT®

mechanizes large match-plate molding faster, easier, more profitably

Jolt; rollover; squeeze; draw; close.

Now you can mechanize all five major operations required to make molds from large match-plate patterns . . . and do it economically . . . with the easy-operating Osborn Rota-Lift.

For many short run jobs previously made on the floor or in a cope and drag operation, you now need only one molder . . . one Rota-Lift.

With Rota-Lift, the size and weight of molds a man can handle are no longer limiting factors, permitting an increase in the number of castings per mold on your present squeezer work.

A single unit can handle a wide variety of flask sizes . . . is quickly adjusted for rapid job changes. Mechanical drawing and handling of the cope increases accuracy, eliminates patching on heavy molds. Costly cope and drag pattern equipment on short run and medium production jobs is no longer necessary.

These unique advantages make Rota-Lift a profitable investment for any jobbing or semi-production foundry. For further details, write *The Osborn Manufacturing Company, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

ROLLOVER

Rollover arms are raised, lifting flask on split trunnions for easy rotation.

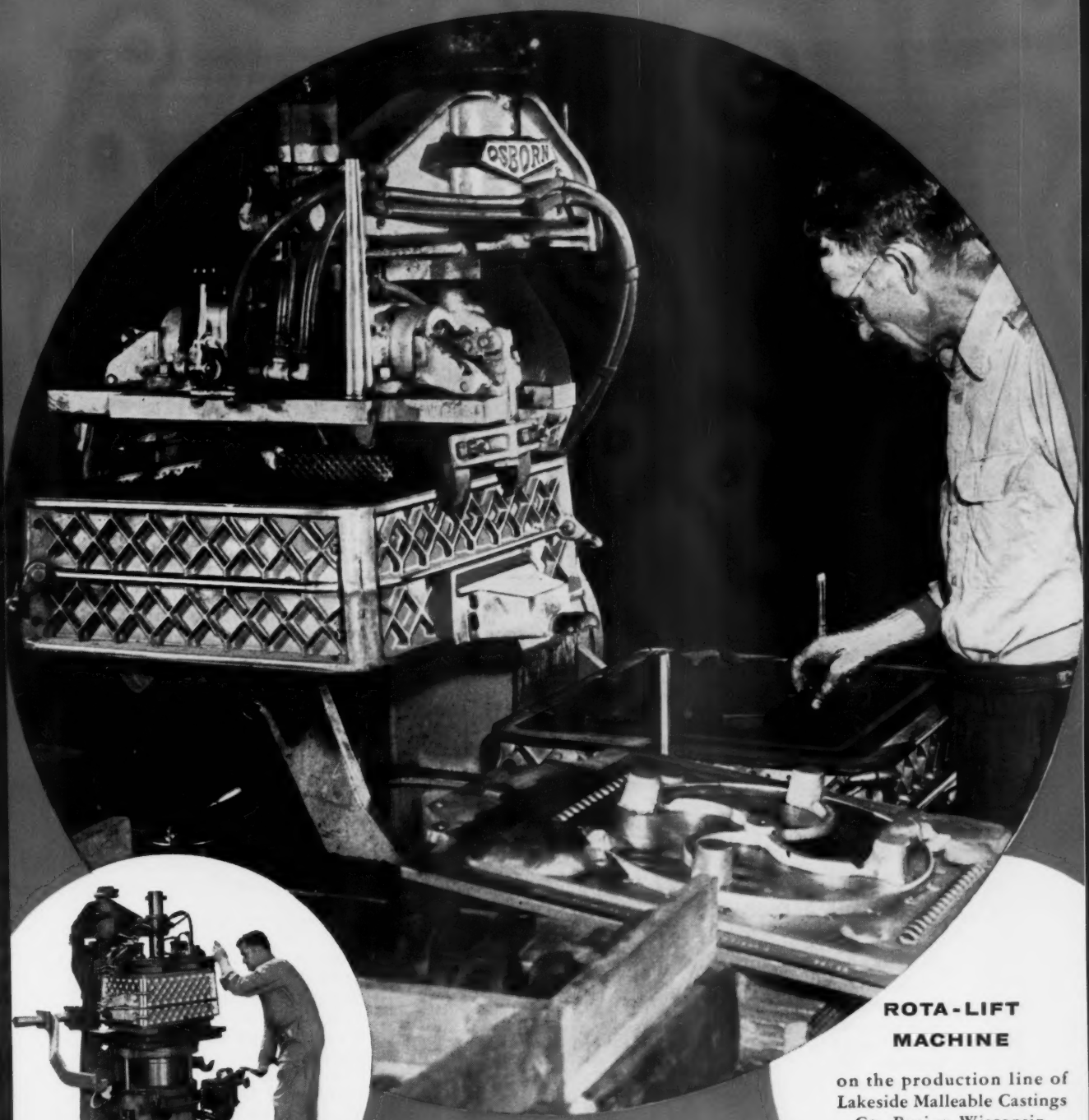
. . . takes place on return stroke of squeeze piston. Pattern plate is vibrated during draw.

DRAWING COPE

HANDLING COPE

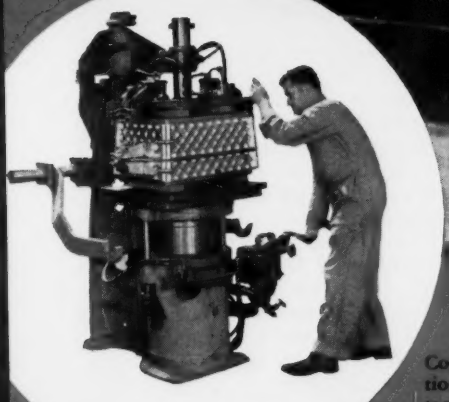
. . . while pattern is manually drawn from drag mold. Left knee valve operates pattern plate vibrator, leaving both hands free for drawing drag pattern.

Specify OSBORN . . .



ROTA-LIFT MACHINE

on the production line of Lakeside Malleable Castings Co., Racine, Wisconsin.



CLOSING MOLDS

Cope is swung into closing position and drag raised until it contacts cope. Finished mold is ready for transfer to conveyor or floor.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

.. leader in mechanization for the foundry

Molding Machines
Shell Machines
Core Blowers
Industrial Brushes
Brushing Machines

Circle 635 on Inquiry Card—Page 51

part surfaces for many of the loops pose a special requirement. Rough forged or as-cast surfaces must be removed by machining, grinding or filing, inside and out. A 124-RMS finish is a common requirement. The purpose of this requirement is to reveal small defects, undisclosed by inspection, which might constitute stress raisers and to safeguard against surface irregularities which might cause accumulations and concentrations of objectionable contaminants.

Heat Treatment—Heat treatment of valve parts for primary loops demands special consideration, particularly with austenitic nickel-chromium steel castings. They are unlike ferritic carbon and low-alloy steel castings in that heat treatment does not refine their grain. The columnar-type crystals of the as-cast structure of massive sections persists through heat treatments. They can be refined only by forging or some other kind of permanent deformation process.

The kind of high-temperature solution heat treatment (1950 to 2100°F followed by rapid cool) given these castings—particularly of type 304—further softens the coarse grain. Thus the material is characterized by low yield strength, and difficulty may be encountered in getting the anticipated strength, particularly in heavy sections.

Any major welds required must be completed before machining since repairs afterward would necessitate an expensive resolution heat treatment. Pickling in acid may be needed for surface cleaning, passivation against corrosion or removal of oxide formed in heat treatment. With surfaces finished by shot blasting, dye penetrant checking after pickling may reveal defects not visible on a freshly shot-blasted surface. Thus considerable attention must be given the technique whereby surfaces are finished for inspection before final cleaning.

Radiographic Inspection—Radiographic techniques for the inspection of these parts are of vital importance. Gamma radiography with cobalt 60 sources is convenient and satisfactory for most valve part sections. Some of the more massive sections may, however, require high-voltage x-ray or even a betatron.

Radiographic requirements usually are in terms of ASTM standards. Resolution is judged by showing a 2 per cent penetrameter on the film. A Class I indication by these standards is admissible without repair in all current specifications. A difference of opinion exists as to whether larger Class II indications should be admissible. When they can be shown to be confined to the deep interior or to low-stressed areas, they are considered acceptable for most purposes.

Magnetic Particles — For ferritic steel parts, both forged and cast, magnetic particle inspection is a useful tool for picking up linear discontinuities in or near the surface. This method has been used widely for inspection of high-quality valve parts, and procedures for its use also have been adopted by ASTM.

Ultrasonic Inspection — Some use has been made of ultrasonic inspection, but on the whole, this technique has not reached a satisfactory state of development as applied to the forms involved.

This article is condensed from a paper presented at the Second Nuclear Engineering and Science Conference, Philadelphia, March 11-14.

Book Review

Machine Trades Blueprint, by Ihne and Streeter, 104 pages, published by American Technical Society, 884 East 58th St., Chicago 37, Ill. Price $2.95.

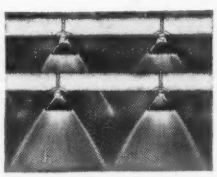
Revised edition presents a comprehensive discussion of basic principles of blueprint reading with

Here is a Highly Efficient and Versatile Foundry Screen

For the low-cost screening of foundry sands, the Leahy® Screen with FlexElex® heating is exceptionally efficient and versatile, especially when damp materials must be handled. Screening of different sizes is no problem. Jackets are changed in a matter of minutes. Send for full information.

For Wet Screening

The addition of CONCENCO® Spray Nozzles is both simple and inexpensive. The water feed pipe is simply drilled with one oversize hole for each nozzle. Clamp on the nozzles, align and get results. May also be used for air nozzles with moulding equipment.



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CONCENCO PRODUCTS

★ *The ORIGINAL Deister Company* ★ *Inc. 1906*

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A LETTER
TO FOUNDRYMEN:

Here at RCI we are happy to note the steadily increasing volume of orders from foundry customers for COROVIT, our self-curing binder, which is finding wide acceptance in the production of extremely large and complicated cores, as well as smaller pieces with unusual contours.

Reichhold Chemicals, Inc., as exclusive licensee of Oel & Chemie Werk A.G., Hausen, Switzerland, which has pioneered in development and research work in the field of self-curing binders since the early 1940's, controls U.S. Patent 2,556,335.

One of the principal features of this patent (copy of which will be supplied on request) is its coverage of use of a wide range of chemical accelerators to control the room temperature curing and setting-up rate of the specially prepared oil binder in a foundry sand mixture.

While we welcome COROVIT customers as free licensees of our product and processes, it has been called to our attention that certain companies have been manufacturing and marketing self-curing binders in violation of our patent, which necessitates this warning that such practice is rendering them and their customers liable to infringement suits.

Very truly yours,
REICHHOLD CHEMICALS, INC.

Vice President, Foundry Division

Creative Chemistry . . . Your Partner in Progress

REICHHOLD

Synthetic Resins • Chemical Colors • Industrial Adhesives • Phenol
Formaldehyde • Glycerine • Phthalic Anhydride • Maleic Anhydride • Sebacic Acid
Sodium Sulfite • Pentaerythritol • Pentachlorophenol • Sulfuric Acid
REICHHOLD CHEMICALS, INC., RCI BUILDING, WHITE PLAINS, N. Y.

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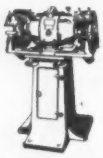
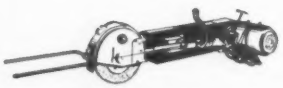
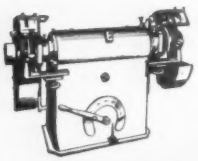


DIRECT DRIVE



SWING FRAME



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GRINDERS

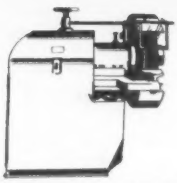
These superb electrical grinders . . . ⅓ to 40 hp . . . set the pace for highest quality and efficiency . . . and for amazing savings in cost and maintenance. Preferred by industry everywhere!

United States Electrical Tools are electrically and mechanically correct.

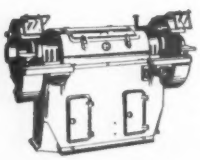
ATTRACTIVELY PRICED

United States Electrical Tools

Over 60 years of Service to Industry



VARI-SPEED SINGLE OR DUAL



BELT DRIVE

PORTABLE 1/3 to 7½ hp

GRINDERS

Precision-built for speed and economy. Direct gear, belt drive, swing frame, vari-speed single or dual motor, portable, bench, angle plate, die, wet, disc and snagging grinders; combination grinder and buffer.

ALL ROTATING PARTS AND SPINDLES ARE PRECISION-BALANCED DYNAMICALLY BY LATEST ELECTRONIC EQUIPMENT

WRITE FOR CATALOGS

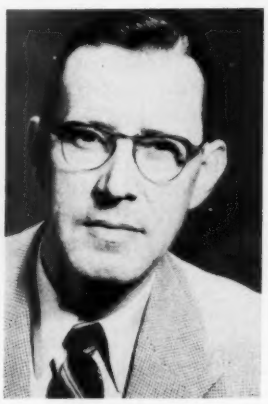
The United States Electrical Tool Co.
3640 LLEWELLYN ST., CINCINNATI 23, OHIO

emphasis on the problem of visualization. One chapter is devoted to developing the ability to visualize an object from its blueprint representation. A series of industrial prints, each with a full-page question sheet, is included.

National Castings Council Holds Annual Meeting

Annual meeting of the National Castings Council was held in Chicago, May 14. The day's program included reports on new activities of several member organizations, discussions of problems created by actions in Washington, and a visit to the foundry exhibit of the Museum of Science and Industry.

Council members expressed concern over the threat of curtailment in activities of the Business and Defense Services Administration at Washington through cuts in the budget. A telegram was sent to the chairman of the Senate subcommittee on appropriations for the Department of Commerce, urging restoration of funds for continuation of industry divisions of BDSA.



BRADLEY B. EVANS
President

In the annual election of officers, Bradley B. Evans, sales manager, Empire Steel Castings Inc., Reading, Pa., was named president. Mr. Evans is president of the Alloy Casting Institute, one of the 11 societies and associations represented in the council. He has been sales manager of Empire since 1940, and has been in the foundry industry for the last 30 years.

Other officers elected include: Vice president, Howard F. Park Jr., vice president, sales, General Steel Castings Corp., Granite City, Ill., and president, Steel Founders' Society of America; treasurer, F. Ray Fleig, president, Smith Facing & Supply Co., Cleveland; secretary, Frank G. Steinebach, editor, FOUNDRY.

Core making at Aluminum Casting and Engineering Company is as well laid out as the most modern step-saver kitchen. The worker is never more than one or two steps from the core shooter that fills the core box, to the CO_2 tank and gas injector, to the work area where the cured core is removed.

This close-up of the CO_2 tank and gas injector reveals the simplicity of the operation. By the time the worker has removed the core box from the gas injector and placed it on the work area, the core is cured and ready for removal.

Intricate Aluminum Casting Cores

CURED IN 15 SECONDS!

Aluminum Casting and Engineering Company of Milwaukee is one of the pioneer firms in fabricating parts of lightweight aluminum.

They manufacture a particularly intricate aluminum casting for the upper gear housing of one of America's most popular 25 h. p. outboard motors. This casting is made by using a permanent mold and a CO_2 set sand core. Before they began making this casting, the core was formed of four separate sections and then pieced together.

CO_2 MAKES A ONE-PIECE CORE POSSIBLE

Now, with the CO_2 set process, the core is made in one piece and cures in 15 seconds, without baking or drying. Core making with any other method would be virtually impossible because the intricate nature of the core requires great strength and complete curing *before* handling. Aluminum Casting and Engineering Company reports that they can control the strength of the cured core by the amount of CO_2 set binder mixed with the sand . . . an important control factor.

The CO_2 set core has a high quality finish when removed from the core box. This greatly cuts down the amount of hand labor required to clean-up and finish the cured core. Because the sand is extruded into the core box, there is no abrasive action and wear. This allows use of a lightweight core box made of aluminum.

CO_2 set can be used to cure sand molds and cores for every type of ferrous or non-ferrous casting. We will be glad to show you how your time and dollar investment in molds and cores can be greatly reduced. Mail the coupon for full particulars.

World's Largest Producer of

THE LIQUID CARBONIC CORPORATION

Chicago 23, Illinois

Here is the rough casting and the sand core side by side. Because of its dimensional stability, the CO_2 set core contributes greatly to the high quality of the aluminum casting.

THE LIQUID CARBONIC CORPORATION
3150 South Kedzie Avenue • Chicago 23, Illinois

Please send me complete information on CO_2 set for curing sand molds and cores.

Name _____

Company _____

Address _____

City _____ Zone _____ State _____

Industry Briefs

CRUCIBLE Steel Co. of America, Pittsburgh, is undertaking a $1½ million expansion program for Vacuum Metals Corp., an operating division of the company's Sanderson-Halcomb Works at Syracuse, N. Y., to double its capacity for production of high-purity, vacuum-melted materials. The program will include a vacuum induction furnace capable of producing 3000-lb ingots, a 20,000-sq-ft melt shop building which will house the furnace and also provide space for expansion and a 17,000-sq-ft metallurgical-chemical laboratory building for production control and development. Construction is expected to be completed before the end of the year.

Lebanon Steel Foundry, Lebanon, Pa., has purchased a 2-million-volt x-ray machine for radiographic inspection of steel castings. The new machine supplements 1-million-volt and 220,000-volt units already in use. The enlarged capacity and facilities will permit x-ray inspection of metal section thicknesses from ¼ to 12 in. The new unit is being operated in Philadelphia, and its excess capacity will be available to metalworking plants, fabricators and testing laboratories in that area.

Stroman Furnace & Engineering Co., Franklin Park, Ill., has completed an expansion of its manufacturing facilities. The new building completes a straight-line manufacturing operation covering a city block. Engineering department facilities and personnel have been doubled to permit continued rapid development of new foundry equipment, especially for melting and processing operations in the light metals field. A new automatic switchboard and teletype service also are being installed.

Devcon Corp., Danvers, Mass., manufacturer of a plastic steel, has appointed five new industrial suppliers of its products. They include Tropical Supply Inc., Corpus Christi, Tex.; Western Belting & Mechanics Inc., Los Angeles; Sterling Products Co., Moline, Ill.; Harry P. Leu Inc., Orlando, Fla., with a branch office in Miami; and Tidewater Supply Co., Norfolk, Va., with branch offices in Richmond and Roanoke, Va.

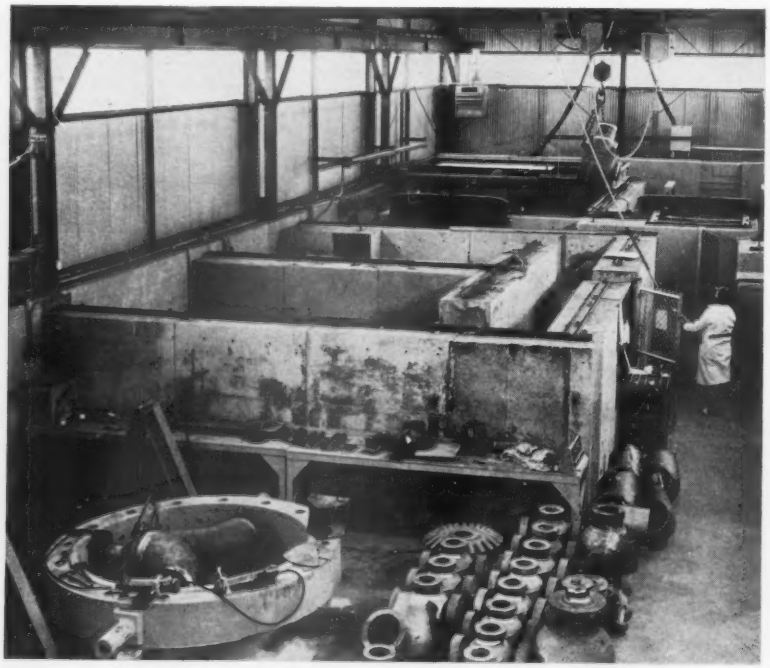
Arwood Precision Casting Corp., New York, has completed negotiations for the purchase of Duncan-Rohne Co. and Malco Metal Products Co., both of North Hollywood, Calif. Duncan-Rohne is a large producer of nonferrous investment castings, and Malco specializes in the machining of castings. Both companies will continue operations in North Hollywood, as subsidiaries of Arwood.

Atlantic Steel Castings Co., Chester, Pa., has begun a more than $250,000 modernization program which includes installation of a Swindell electric arc melting furnace of 22,000-lb capacity. The new furnace will be housed in a modern building with a 15-ton overhead electric crane. Elimination of the old furnace from the building in which it is housed will make available considerably more molding space.

W-K-M Division of ACF Industries Inc. will build a $1 million foundry on 80 acres of land at Richmond, Tex. Production is expected to begin by summer, 1958. The plant will produce castings for ACF's oil field equipment plant at Missouri City, Tex., and will employ about 500 persons.

American Lithium Institute Inc. has moved to new, larger quarters at 32 Nassau St., Princeton, N. J. Mail should be addressed to P.O. Box 549, Princeton.

National Lead Co., New York, is undertaking a major expansion of the Niagara Falls, N. Y., plant of its Titanium Alloy Mfg. Division. Titanium



24 MILLION VOLTS: Bonney-Floyd Co., Columbus, O., steel foundry, has installed the first privately owned industrial 24-million volt betatron in the United States outside the plant of the manufacturer, Allis-Chalmers Mfg. Co., West Allis, Wis. The betatron laboratory is in the nondestructive testing building, within stub walls 6 ft 6 in. high so that the castings can be brought in overhead. The unit is being used to maintain and improve quality standards for all castings with heavy sections. Some time is expected to be available for custom work for other foundries or fabricators. In this view, a casting is hovering over the wall separating the betatron inspection rooms.

YESTERDAY'S OPTIMUM ---FERRO KOTE IS TODAY'S PRACTICE

More and more foundrymen prefer Ferro Kote core and mold coatings every year.
Less Cleaning Costs
✓ No sand fusion
✓ Smoother surfaces
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SOLD WITH SERVICE
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Pearson & Smith, Spokane, Washington
Don Barnes Foundry Supplies & Equip. Hamilton, Ontario, Canada
Western Foundry Sand Co. Seattle, Washington
Kramer Industrial Supply, Inc. Denver, Colorado
Horace G. Stults, York, Penna.
Springfield Facing, Inc. Harrison, New Jersey
C. Eugene Silver, Houston, Texas

Alloy's products include zirconium silicate for foundry mold and core application, zirconia refractories and refractory cements.

Clark Equipment Co., Battle Creek, Mich., has appointed three new dealers to sell and service the line of industrial trucks produced by the company's Industrial Truck Division. These dealers include Brodie Industrial Trucks Inc., 1168 Lexington Ave., Rochester, N. Y.; Atlantic Industrial Truck Corp., 11 Main St., Little Ferry, N. J.; and Elm Equipment Co., 401 Beauregard St., Mobile, Ala.

D. W. Clark & Co., Boston nonferrous foundry, is planning to build a new foundry in East Bridgewater, Mass., this summer. It will be the first resident in a new industrial park being laid out by the East Bridgewater industrial commission. Clark & Co. has specialized in copper-base castings for the electrical industry for 55 years.

Union Carbide Corp. is the new name of the former Union Carbide & Carbon Corp. The names of three divisions of Union Carbide also have been changed. Linde Air Products Co. has become Linde Co.; Carbide & Carbon Chemicals Co. now is Union Carbide Chemical Co.; and Carbon Realty Co. will be known as Union Carbide Realty Co.

Weldaloy Products Co., Van Dyke, Mich., has opened a new plant in Burbank, Calif., which will serve as headquarters for a newly created Weldaloy Western Division. Weldaloy is a producer of copper alloy tube mill electrodes and of inner and outer tube mill conductor castings which weigh up to 4500 lb and more.

Armour Research Foundation of Illinois Institute of Technology, Chicago, has broken ground for a $1.1 million building addition at the north end of the foundation's Metals Research Building. Completion of the addition is expected by late fall. New research equipment valued at about $175,000 will be installed.

Air Pollution Foundation has moved to 25566 Mission St., San Marino, Calif. Telephone numbers are Sycamore 9-9126 or Ryan 1-3323.

Steel City Testing Machines Inc., Detroit, has appointed two new sales representatives. The representative for northern Texas, eastern Oklahoma and the Shreveport area in Louisiana will be Southwestern Precision Sales Inc., 3030 Dyer St., Dallas, Tex. A. L. Spencer, 260 Vine St., San Jose, Calif., will be Steel City's own representative in the several counties encompassing the San Francisco Bay area.

Air Products Inc., Allentown, Pa., has opened a new sales office for its Cylinder Gas Division in the Grant Building, Pittsburgh. Facilities for the manufacture of oxygen, argon and other gases will be situated in Aliquippa, Pa., and will serve the entire Pittsburgh and western Pennsylvania area. C. W. Doumont, formerly district manager of Air Products' Parkersburg, W. Va., facility, will manage the new operation.

E. F. Houghton & Co., Philadelphia, is constructing new factory, office and laboratory facilities in Detroit which will more than double the size of its present plant there. The new plant will manufacture practically the same oil and chemical specialty line now being made in Houghton's Chicago, Philadelphia and San Francisco plants. Production is expected to start by the end of the year.

Harper Landell & Associates, a new company which includes the entire staff of the late Harold Van Doren, has been formed for the practice of industrial design and human engineering. It will maintain offices, design studios and model shop at 1717 Sansom St., Philadelphia, Pa.

Baker-Raulang Co., Cleveland, has named four new distributors for its line of material handling trucks. They include Huss Equipment Corp., 1039 Custer Drive, Toledo, O.; Clark Materials Handling Co., 122 S. Cameron St., Harrisburg, Pa.; Hugh R. Noel Co., 531 Brook Rd., Richmond, Va.; and Wilson Industiral Equipment Inc., 6431 N. W. 32nd St., Miami, Fla. Wilson also has branch offices at 920 W. Adams St., Jacksonville, and 4709 E. Hillsborough Ave., Tampa, Fla.

"Oh, he didn't complain about my sideline—he just thought my price was outrageous."

U.S. Rubber Co. is constructing a new sales branch and warehouse in the Brook Hollow industrial district of Dallas, Tex. The new building will be completed in the fall and will replace outgrown offices and warehouse facilities at two other locations. More than 125 employees will work in its 102,889 sq ft.

Metalock Inc. has been formed in Milwaukee with an authorized capital stock of 20,000 shares of common at a par value of $1 per share. It will conduct a foundry and manufacturing business and a machine shop. Registered agent for the corporation is Ronald Dietrich, 8595 S. 27th St., Milwaukee.

Centerville Foundry Inc., Centerville, Iowa, has been incorporated with capital of $100,000. Officers are W. H. Morse, president and secretary, and Dean Lentz, vice president and treasurer, both of Centerville.

Barclay Foundry Inc. has begun production in its new $100,000 plant at 4239 W. Lincoln Ave., Milwaukee. The 18,000-sq-ft plant consolidates operations under one roof and provides a 50 per cent increase in space over former facilities.

Foxboro Co. has begun construction of an addition to its instrument manufacturing plant at Foxboro, Mass., which will expand production capacity 50 per cent. It will add a total of 175,000 sq ft of space to the firm's facilities. Completion is scheduled for early summer, 1958.

Inductotherm Corp., Delanco, N. J., has appointed Interstate Supply & Equipment Co., 647 W. Virginia St., Milwaukee 4, to handle its complete line of induction melting and heating equipment.

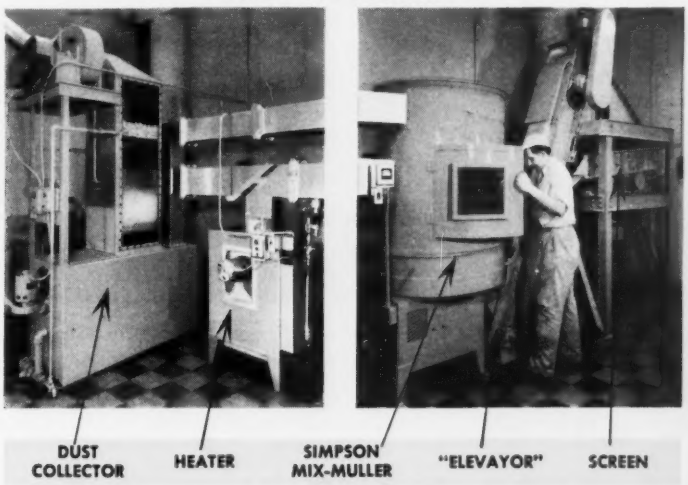
Arrow Aluminum Casting Co., Cleveland, will be represented in Wisconsin, upper Michigan and northeastern Illinois by R. L. Hundley Co., Milwaukee.

Blount Avenue Foundry, Knoxville, Tenn., recently suffered damage by fire estimated at from $2500 to $3000.

NATIONAL

SHELL-MULL

HERE'S THE EQUIPMENT



New NATIONAL Service Available — Make your own production scale tests with SHELL-MULL:

The services of this simple, practical unit are now being offered at no charge to foundrymen.

The equipment shown above is part of National's *Performance Laboratory*. Capable of producing 800 to 1200 lbs. of coated sand per hour, it is not a pilot plant . . . equipment used is exactly the same as that now in use in many leading foundries. Full scale tests can be made with your own sand, a resin of *your* choice and under *your own* supervision. All tests are conducted to provide the user with *tangible evidence* of the superiority of SHELL-MULL in the efficient, *consistent* production of resin bonded sands that are in keeping with standards demanded by experienced foundrymen. The results of such a test can be invaluable to you.

Write today for full details regarding arrangements. There is, of course, no obligation.

MANUFACTURERS OF SIMPSON MIX-MULLERS

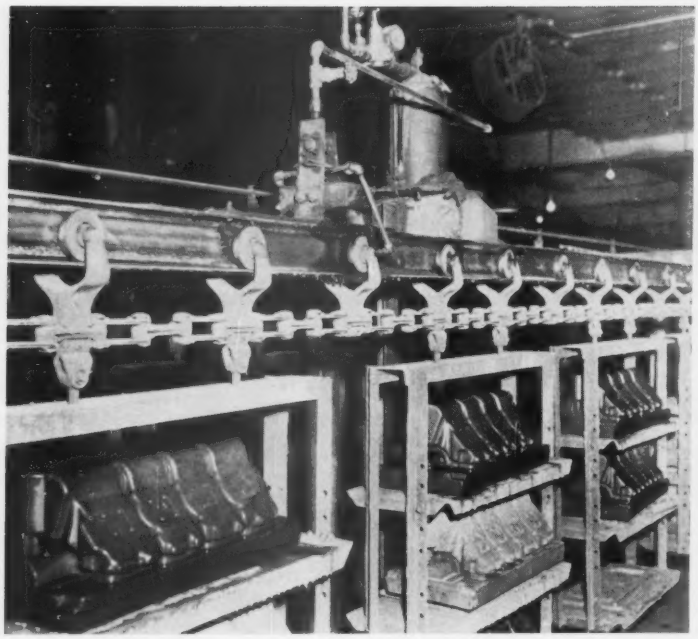
600 Machinery Hall Building

Chicago 6, Illinois

NATIONAL ENGINEERING COMPANY

F-575

Circle 641 on Inquiry Card—Page 51



Automatic lubricator at center delivers colloidal graphite to wheel bearings of core conveyor

Closeup of wheel bearing shows how spray lubrication is applied as conveyor moves along

Conveyor Sprayed Automatically

With Heat-Resistant Lubricant

Lubricating unit at upper right sprays carrier chains of vertical core ovens. Actual lubrication occurs below floor level

CONVEYOR lubrication problems caused by high temperatures in drying and baking ovens in the foundry department of Studebaker-Packard Corp., South Bend, Ind., have been solved by an automatic spray system which uses a colloidal graphite lubricant.

Mineral spirits, the liquid carrier in this product, provide sufficient wetting action to bring the lubricant into contact with all surfaces of moving parts. The carrier then evaporates, leaving a thin, tenacious lubricating film of graphite, chemically inert and stable at high temperatures.

"At our foundry," explains Maintenance Superintendent L. S. Murton, "racks of molds and cores for castings are placed on conveyors and carried through baking ovens at operating temperatures from 250 to 450°F. Before our use of colloidal graphite on the conveyors, we first employed a heavy grease, then a conventional oil. Neither proved satisfactory. The heat caused gumming and partial decomposition of the oil and left a deposit that clogged bearings. This condition resulted in excessive downtime for the conveyor, as well as costly cleaning and parts replacement.

"Diluted 20 to 1 with a low-carbon oil," continued Mr. Murton, "the new dispersion forms a dry-lubricating graphite film over bearings, bushings, races and other critical parts. It is applied in the same manner as the previous lubricant and requires no change in our feed system. It does not burn off or leave an oily base that holds abrasive dust or a sticky residue that freezes up bearings. As a result, we are making worthwhile savings in lubricant and labor, and marked reductions in conveyor wear have been noted. The maintenance dollar for this equipment has been stretched more than 1500 per cent by use of the colloidal graphite."

The graphite lubricant is used on six 100-ft long conveyor lines serving horizontal ovens and on chains serving six 30-ft vertical ovens. Each conveyor line is equipped with a 6-qt lubricator at the point where the bearings have lost considerable oven heat and are close to room

Reduce Down Time and Operating Costs with

High Quality

A. P. GREEN

REFRACTORY PRODUCTS

High quality A. P. Green refractory products pay off in service with greater tonnages, smoother operation, and lower maintenance costs.

There is an A. P. Green product designed to meet industry's requirements for almost any type service. You'll find that it pays to standardize on A. P. Green quality products.

For specific recommendations on your refractory problems, get in touch with your local A. P. Green distributor. He's listed in the yellow pages of your telephone directory.

PLASTIC FIREBRICK

CASTABLE REFRACTORIES

PLANTS: Mexico, Mo.—Woodbridge, N. J.—Sulphur Springs, Texas—Jackson, Oak Hill, South Webster, Ohio—Philadelphia, Pa.—Troy, Idaho

In Canada: A. P. Green Fire Brick Company, Ltd., Toronto 15, Ontario

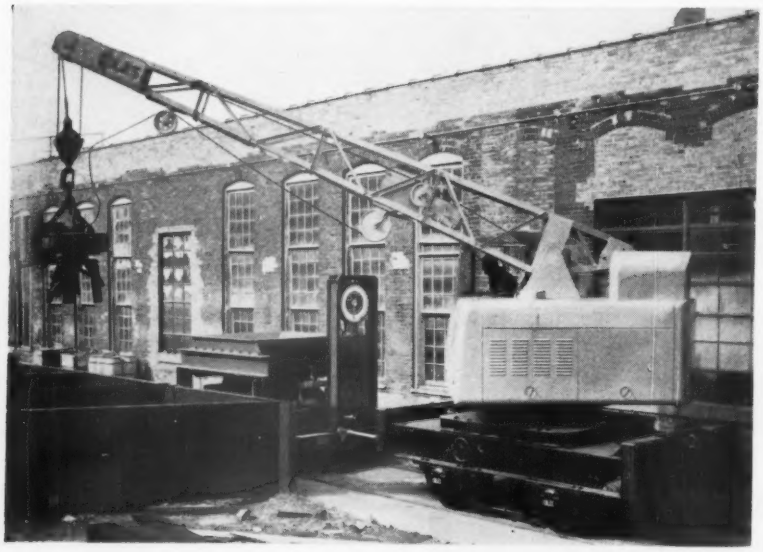
A P Green
REFRACTORY
PRODUCTS

A. P. GREEN FIRE BRICK COMPANY
Mexico, Missouri, U.S.A.

DISTRIBUTORS IN THE PRINCIPAL CITIES OF THE WORLD

Everything's stacked in your favor with this full-slewing cantilever boom

Rail or truck mounted—equipped with tongs, slings, clams or electromagnets—a Coles Mobile Crane is the foundry industry's most versatile handling tool.



Available L.P.G.-, diesel-, or gasoline-electric powered in capacities from 5 to 50 tons. Available on long-term lease arrangement, too. Write for new Coles fact-book, "101 Cost-Cutting Ways".

COLES
CRANES
JOLIET 3, ILLINOIS

temperature. In the vertical ovens, racks are loaded on the up side. Cores are dried in the upper section and unloaded on the down side; chains are lubricated below floor level, at which point they are ready to repeat the cycle.

Lubricator reservoirs are pressurized with solenoid-operated air valves. The tripping mechanism for the solenoid valve was designed by Studebaker personnel. Here's how it works: A lever is tripped by a cam on the moving trolley, and the lever depresses a ½-in. diam button switch, closing the electrical circuit which energizes the solenoid. The solenoid opens the air valve, and the lubricant is forced under pressure to the spray nozzle. Timing is governed by the speed of the conveyors and oven chains.

Two different spray nozzles are used on the horizontal conveyors. At one lubrication station, a twin nozzle is positioned so that the graphite dispersion is sprayed on the trolley-wheel bearing races. At another station, the spray is timed to deliver when the small-nose sprayhead is in alignment with the bearing retainer. The spray nozzle is a piece of ⅛-in. copper tubing flattened at the end to a slit opening. Microscopic and submicroscopic in size, the colloidal particles will not clog lubricator nozzle orifices or passages. Maintenance of the lubricators amounts merely to infrequent cleaning of dust that has settled on the units.

The lubricant used at Studebaker-Packard is 'dag' Dispersion No. 2404, a product of Acheson Colloids Co., Port Huron, Mich.

NRC Metals Corp. Becomes Columbia-National Corp.

Columbia-National Corp. is the new name of the former NRC Metals Corp. A half interest in the company, formed originally as a subsidiary of National Research Corp. to produce and market rare metals, has been acquired by Columbia-Southern Chemical Corp., a subsidiary of Pittsburgh Plate Glass Co. Columbia-National will be operated as a jointly owned subsidiary with executive offices in Cambridge, Mass., and principal production facilities in Santa Rosa County, Fla., near Pensacola.

Columbia-National Corp. soon will complete construction of a $7.5 million plant for the production of zirconium in Milton, near Pensacola. It will process zircon ore into zirconium of sufficient purity for use in nuclear power reactors.

Circle 643 on Inquiry Card—Page 51

Where Do Great Ideas Come From?

From its beginnings this nation has been guided by great ideas.

The men who hammered out the Constitution and the Bill of Rights were thinkers—men of vision—the best educated men of their day. And every major advance in our civilization since that time has come from minds *equipped by education* to create great ideas and put them into action.

So, at the very core of our progress is the college classroom. It is there that the imagination of young men and women gains the intellectual discipline that turns it to useful thinking. It is there that the great ideas of the future will be born.

That is why the present tasks of our colleges and universities are of vital concern to *every* American. These institutions are doing their utmost to raise their teaching standards, to meet the steadily rising pressure for enrollment, and provide the healthy educational climate in which great ideas may flourish.

They need the help of all who love freedom, all who hope for continued progress in science, in statesmanship, in the better things of life. And they need it *now!*

If you want to know what the college crisis means to you, write for a free booklet to: HIGHER EDUCATION, Box 36, Times Square Station, New York 36, N.Y.

HIGHER EDUCATION
KEEP IT BRIGHT

PUBLIC SERVICE ADVERTISING COUNCIL

Sponsored as a public service, in cooperation with the Council for Financial Aid to Education

Man to Man

By RALPH L. LEE, *President*

Lee Hobby Foundry
Birmingham, Mich.

"A successful salesman proves need for his product, the ability of the product to solve that need completely and the ability to buy"

A Formula for More Sales

I JUST returned from quite a speechmaking trek, which took me to Louisville, Memphis, Des Moines and Omaha. The only reason I mention it is that of the many such trips I make, this is the first for a long time in which I didn't go through a single foundry—in fact, I didn't even meet a foundryman.

Practically all of the people I met individually or addressed collectively were up to their ears trying to sell field sales representatives on getting up off their posteriors, girding up their loins and, with the feel of life along their keels, inoculating their retail dealers with the will to sell more suspects and prospects on buying more automobiles, household appliances and such.

Scattered here and there among all these folks were oldtimers who had attended the sales schools I held so many years ago that I hate to think of the number. I swelled up a bit with senile pride upon hearing them say how much those old schools had contributed to their success through the years. But the thing that perked me up the most was their expressed conviction that during this time of ever-stiffening competition, we should get back again to the basic, elementary sales fundamentals we all cut our teeth on and won our spurs with.

In fact, I've been asked to shake the cobwebs from my fading memory and toddle on down to a stemwinder sales revival meeting with a load of the oldtime sales religion. So, I've been trying to get my notes together. Wrestling with this tough problem and at the same time facing the deadline imposed upon me by my exacting FOUNDRY editor (Simon Legree Steinebach I call him when I'm late), it suddenly dawned on me that if I were to substitute castings for motor cars and appliances, the basic fundamentals of selling I'm trying to riddle out of the past should apply just as well to the foundry business.

So, killing two birds with one stone (I hope), I thought it might be a good, worthwhile idea to have you look over my shoulders, so to speak, while I try to reconstruct a brief outline of the sales principles that guided our efforts in the pioneering days of household refrigeration.

I must admit that it is a far cry from home selling to factory selling, but there is one thing in common—people with money or its equivalent. So let's take a swing at it and see what happens.

1. A Fact to Face—No matter how badly a salesman needs commissions or his company needs sales, a salesman cannot create buyers. He can locate needers of castings and wanters with the wherewithal and help them over the hump to the dotted line, but they must exist before he starts out. He has to have raw material for processing.

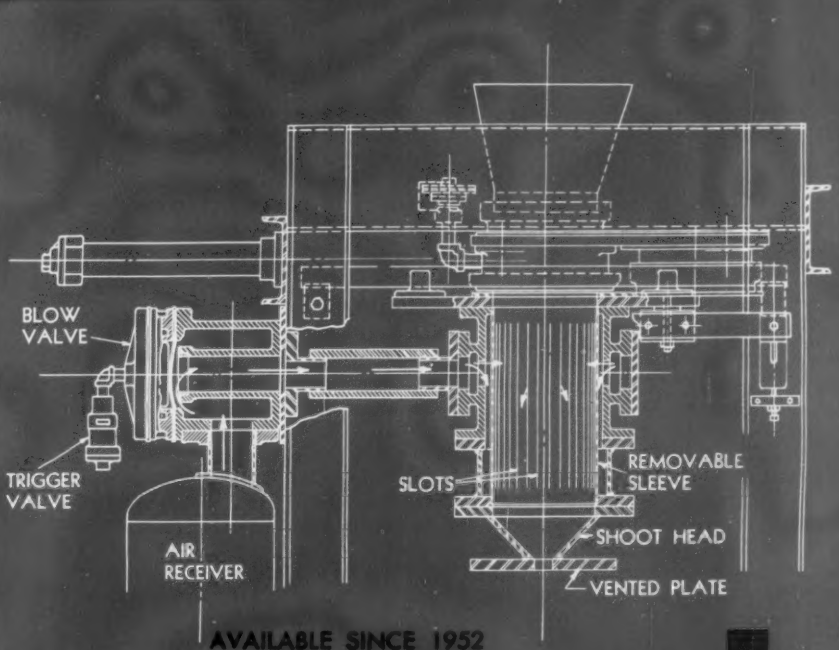
Any salesman who thinks he can create buyers will fan air and grow hoarse while getting red in the face pounding tables. High-pressure salesmanship is for sideshow pitchmen and snake-oil doctors. Hypnotism seems to be out.

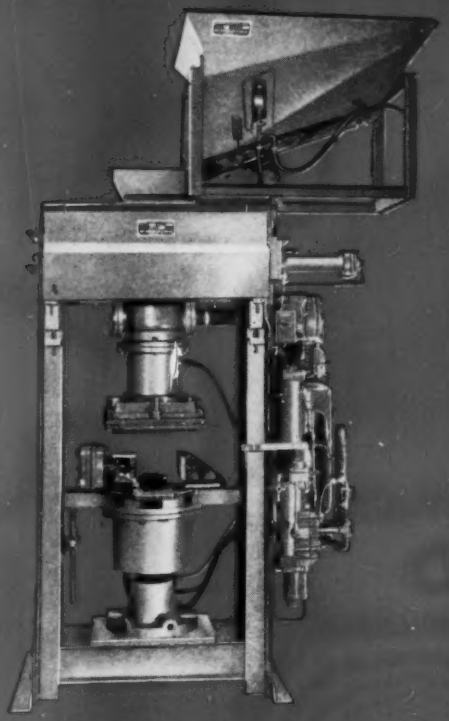
High-pressure selling is for sideshow pitchmen and snake-oil doctors

2. Needers (paydirt)—The salesman's first job is to find needers—both folks who already know they are needers and those who don't even suspect it. Both kinds are valuable, but the ignorant kind serve the salesman as his best raw material for pulling sales rabbits out of hats during periods of cutthroat competition. An awful lot of suspect ore has to be handled to get enough needer material to process. Lots of legwork is necessary—one whale of a lot of FBIing, aboveboard snooping and just about everything short of wiretapping.

3. Needers to Wanters—With sufficient raw material, the salesman's next job is to sell the ignorant needers on their need (with proof). Then taking the newly enlightened needers together with needers who already knew their condition, the salesman's next job is to process them into wanters. Painting pictures of their need and the profit to them of having that need completely satisfied usually does the trick, provided that the salesman can keep his need for commissions and his company's need for sales out of the picture he paints (working your way through college seems to be losing its effectiveness).

4. Need/Product = $$—The salesman's next job is, of course, to prove to the wanter that his product not only will satisfy his need completely, but that it will be worth more to him than the money it costs. This, by every measure, is no trifling chore. Slick talk is of little help, bluff is





AVAILABLE SINCE 1952

#101-EO DEMMLER CORE BLOWING MACHINE

This machine may be used for shooting cores by substituting a shoot head for the standard blow plate.

Best quality cores are often produced by the time tested blowing method, and when it is preferred to use the machine as a blower the change can be made quickly and conveniently.

These are the same type machines as the successful Demmler mold blowers which have been breaking molding records for the past three years.

Yes, you can have a machine that gives you complete flexibility, to blow or shoot as you choose. Write us for complete data on this Demmler 101-E machine.

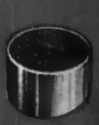
DEMMLER

FIRST NAME IN CORE BLOWERS

ONE MACHINE DOES BOTH ..... BLOWS OR SHOOTS CORES

PRECISION CORE BOX VENTS

Demmler is by-far your best source for precision core box vents, manufactured by specialists who pioneered in the core blower industry. Many sizes, slot widths and screen meshes are available in brass and steel core box vents.



NEW *HL 150 Mesh Vents*

A new general purpose vent which practically eliminates the cleaning coarser screens demand. Write for literature on Demmler vents.

DEMMLER MANUFACTURING CO.

KEWANEE, ILLINOIS

Circle 645 on Inquiry Card—Page 51

transparent and ignorance disastrous.

At this point the salesman must know his product inside and out, upside and down and through and through from every angle. And this is vital—"He has to tell the truth." Another thing is almost as important: "He has to know the honest-to-goodness truth of his prospect's need, inside and out and up and down" (all of this takes much more time than the run-of-mine salesman feels he can afford to spend).

Note: Even the most talented, skillful and time-proved salesman cannot talk virtue and value into a product. The product has to be a provable bargain before the salesman gets hold of it. This being the case, some foundries might do well, in a competitive pinch, to lay off sales promotional efforts until they get their product into shape—maybe even get out a "new model."

5. The Name on the Dotted Line—The salesman's last step in this sales processing program is to convince his needer-wanter to become a buyer immediately—not one of these days, after he thinks it over, but *now*. Either now or at a definite and specific time in the future—next Tuesday at 3:22 p.m., for instance.

Note—One of the surest ways to keep the name off the dotted line is to let the potential pencil pusher sidetrack the salesman into talking about his competitors. The competitor's name is a bad word for the salesman, for every time he mentions it he's doing an advertising job for his competitor—and for nothing, too.

One of the master salesmen of all time suggested that when a prospect mentions the name of a competitor, or worse yet, glorifies his product, the salesman's best answer is, "Yes, but I'd like to acquaint you with another outstanding value of our cast product service, etc."

So it would seem that the successful salesman's boiled-down formula is this: Enter into a conversation of interest to the suspect or prospect which will lead logically to his need for the product, the ability of that product to satisfy his need completely and his ability to buy now.

Now I know what prompted me to get clear out of character as president of the Lee Hobby Foundry. First, the flattery of my old sales-school graduates and, second, the last issue of FOUNDRY which was loaded with sales promoting dope of one kind and another.

All this reminiscing has thrown me into such a tizzy that I think I'll go up to the foundry and figure out ways and means of putting even greater value into our cast metal products service. We're definitely going to bring out a new model.

Book Review

Manufacturing Methods and Processes by Arthur C. Ansley, cloth, 561 pages, 6 x 9 in., published by Chilton Co., Chestnut & 56th Sts., Philadelphia 39, Pa. Price $12.50.

Book covers the complete production picture from casting processes, stamping, forming, forging, extrusion, powder metallurgy, ultrasonic machining, heat treating, plastics, assembly and finishing, inspection and gaging and woodworking through automation. The volume summarizes production methods and processes and relates the technical, design and manufacturing problems, etc.

Consumption of Shell Resins Is Placed at 1600 Tons Monthly

World-wide consumption of phenolic resins in the production of shell molds and cores is estimated at about 1600 tons a month, nearly 45 per cent of it being used in the United States. Approximately 1600 foundries are using the process on a production basis.

These figures are from a tabulation made by Shallway International Corp., Palo Alto, Calif., with the assistance of a number of resin manufacturers.

Biggest resin users, according to the study, are the United States, Japan and England, these three countries accounting for 1180 tons monthly.

Detailed figures follow:

ESTIMATED SHELL MOLD ACTIVITY

Country	Estimated Number of Foundries	Number of Shell Mold Production Foundries	Monthly Use of Phenolic Resins, Tons
United States	6070	520	700
Japan	2100	325	250
England	4200	350	230
France	3000	65	80
Germany	3090	60	80
Canada	580	95	65
South Africa	500	25	30
Belgium	400	20	25
Italy	1000	14	20
Netherlands	360	12	18
Other Countries of Europe	600	50	50
All Others	3000	55	60

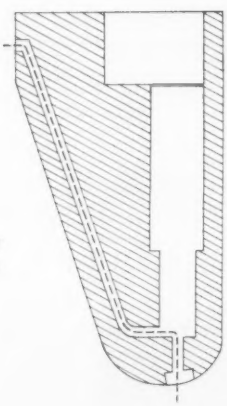
HOW TO DO IT

Substitutes Glass Tubing for Core Rods To Eliminate Core Cracking

TROUBLE was encountered in removing metal core rods from the 1-in.-diam spout cavity of a 300-lb gooseneck casting for an automatic die casting machine. During baking of the core, the rod expanded more than the sand mix and cracked the core. When the mold was poured, metal ran into the cracks and fused the rod to the casting.

The problem was solved by substituting ⅛-in. Pyrex glass tubing for the metal core rods. Tubing is bent to the desired shape over a Bunsen burner. The core is made in halves and pasted after drying. Tubing is used in each half of the spout section of the core (see dotted line in drawing). The core did not crack during drying, and it and the rods were removed from the casting without difficulty.

By EDWARD J. GILBERT
Mattison Machine Works
Rockford, Ill.



Do you have any tricks of the trade tucked away with your foundry experience? Why not release them to fellow foundrymen? FOUNDRY will pay a minimum of $15 for each idea submitted and published. Send a photo or drawing with your idea

STANDARD*ize*

. . . and rest assured!

You can lean back and relax when Standard's famous BLACKHAWK foundry sand is working for you. That's because you know you are using the finest silica you can possibly buy; that your foundry products will be top quality; that they will require less finishing, less clean-up time.

BLACKHAWK is the name, and the Standard distributor in your area is the man who can supply you.

Shipping facilities via two of the nation's trunk line railroads.

STANDARD
Silica Company
OTTAWA • ILLINOIS

Silica Center of the World

Foundry Developments

By EDWIN BREMER
Metallurgical Editor

STUDY of "The Influence of Understressing on the Fatigue Properties of Flake Graphite and Nodular Graphite Cast Irons" by Gilbert and Palmer, is reported in the December, 1956 issue of *Journal of Research and Development* (Birmingham, England). Their findings led to the conclusion that understressing for 20 million cycles at a stress 0.5 ton per sq in. below the fatigue limit does not significantly change the fatigue limit or the fatigue life at stresses above the fatigue limit, of a series of pearlitic and ferritic graphite and nodular graphite irons.

The flake graphite irons tested were not alloyed and in the pearlitic condition a high tensile strength of 20.9 tons per sq in. was obtained. The nodular irons tested were typical of good as-cast pearlitic and heat treated ferritic irons. While other investigators have reported increases in fatigue limit in excess of 30 per cent due to understressing, the irons tested had low tensile strengths and coarse graphite and matrix structures as compared to superior structures in the presently tested flake irons.

Test on irons with high carbon contents cast in 3-in. sections to obtain relatively coarse structures are to be carried out to discover whether results of the other investigators can be repeated.

Shell Molding

REPORTS indicate that scientists at Watertown Arsenal have developed a technique for shell molding which uses sodium silicate or waterglass as the sand bonding agent. Bonded sand is applied to a heated pattern and then the assembly is baked or cured in an oven.

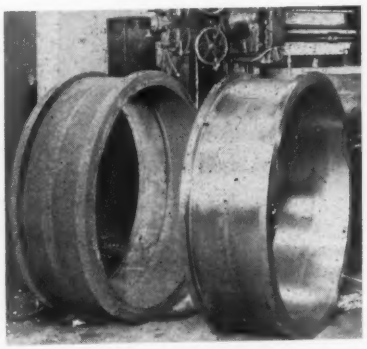
Reduces Iron Ore

NEW organization, R-N Corp., formed by Republic Steel Corp. and National Lead Co., reports development of a direct process for reduction of low and high-grade iron ores. It provides the ferrous industry with high metallic iron feed materials for use in blast, electric, and open-hearth furnaces and in cupolas. The process originally was devised by National Lead in work on separation of iron and titanium from titaniferous ores.

A pilot plant at Republic's Spaulding mine near Birmingham is said to have been producing high metallic iron stock in quantities sufficient for commercial testing purposes. For open-hearths, electric furnaces and cupolas the feed material is in briquets weighing from 5 to 25 lb, while material for blast furnace is in conventional "peach seed" briquets.

Spins Them Out

RECENTLY the Wisconsin Stainless Foundry & Machine Corp., Waukesha, Wis., produced the several 60-in.-diam, 1600-lb castings shown in the accompanying illustration for service in centrifugal separators in a chemical plant. Made by the centrifugal casting process, the castings are 316 ELC (10-14 Ni, 16-18 Cr, 1.75-2.5 Mo and 0.03 C) stainless steel welded together to form double flanged drums. When finished the castings contain 1300 holes drilled through the wall. In addition to making the castings, the firm did the welding, heat treating, rough machining and x-ray examination.



Finds Correlation

METHOD devised by D. Tabor which enables correlation of hardness and tensile tests and conversion of one measurement to the other was found workable according to a research report "The Relationship of Hardness Measurements to the Tensile and Compression Flow Curves." The report is available from the Office of Technical Services, Washington 25, for 50 cents, under the designation PB 121144. Results of experimentation with magnesium-aluminum alloys showed that the approximation of a uniaxial tensile stress flow curve from hardness measurements is possible by utilizing empirical conversion constants. Agreement of the tensile and hardness testing methods is possible on metals such as aluminum, copper and steel. Magnesium is not amenable to such a conversion of testing procedures due to profuse twinning at low stress levels.

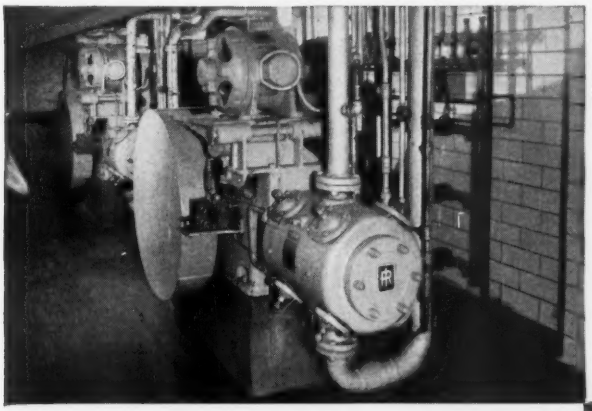
Vacuum Melting

NEW furnace pioneered in titanium melting and described as a major metallurgical breakthrough is being made available, according to an announcement of Titanium Metals Corp. of America, Allegheny Ludlum Steel Corp., and Lectromelt Furnace Division of McGraw-Edison Co. Termed a consumable electrode vacuum remelting furnace, the unit melts titanium, zirconium, high alloy steels and other ferrous and nonferrous alloys which are said to be low in impurities and possess improved properties.

Cut the Cost

PRACTICES to conserve phenolic resin used as a binder in shell molding operations are described in a report of Army-sponsored research into factors influencing the process. The report, designated PB 121031, "Research on Shell Molding," is available from Office of Technical Services, U.S. Department of Commerce, Washington 25, for $1.50. Recommendations for conservation are based on such practices as increased scientific control of variables including grain size and distribution of sand and resin, particle packing and surface preparation of the sand. Knowledge of the binding mechanism was gained through evaluation of various brands of resins by strength tests on shell specimens.

AIR POWER when you need it ...with an ES compressor

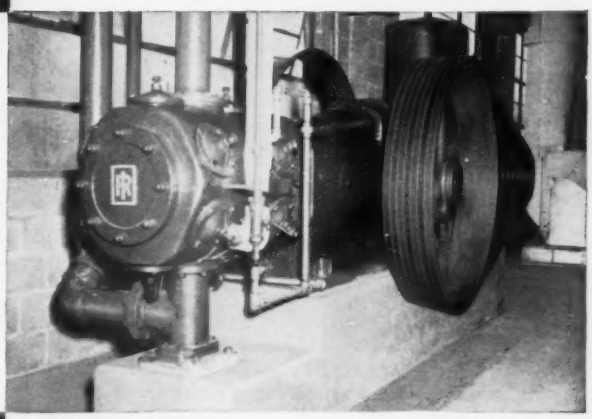


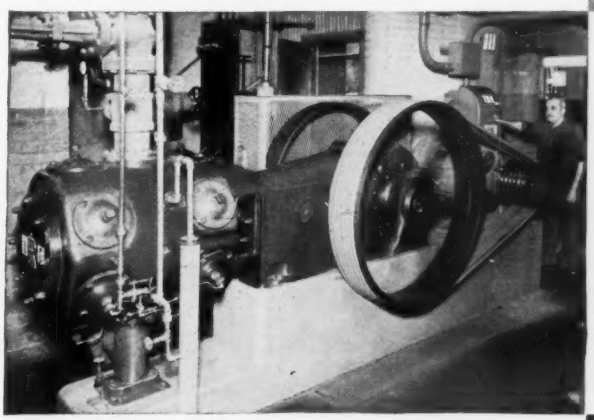
24 Hours a Day

These two Ingersoll-Rand ES compressors are on duty continuously, 24 hours-a-day—supplying instrument air for a large central station power plant. An uninterrupted air supply at constant pressure is essential to the proper functioning of automatic control instruments that have to stay on the job around the clock, month after month, year after year. The overhead motor mounting is but one of the many drive arrangements available.

20 Years of Service

Installed over 20 years ago, this Ingersoll-Rand ES compressor is still in excellent condition — still doing its job dependably, compressing air to 100 psi for general shop service in a large southern manufacturing plant. ES compressors of this age are a common sight in industrial plants all over the country — attesting to the tremendous stamina and long-life built into these heavy-duty machines.





No Forced Shutdowns

Here is one of six 75-hp ES compressors supplying low pressure air in a New England glass manufacturing plant. Since any interruption would result in costly damage to equipment and materials, this company uses dependable ES compressors to furnish a constant supply of process air. Here, as in many other applications, these trouble-free compressors have proven themselves, even under the most adverse conditions.

Ingersoll-Rand ES compressors are available in sizes from 5 to 125 horsepower and for pressures to 2500 psi and vacuums. Horizontal or overhead v-belt drive, direct-connected synchronous motor or steam drives are available. Ask your I-R representative for further details on the unit best adapted to your specific compression problem.

Only I-R compressors have CHANNEL VALVES
Known for high efficiency, quiet operation and exceptional durability. Entirely different. Each valve is a combination of rigid stainless-steel channels and leaf springs, with trapped-air spaces which cushion action.

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News Views

GOLD MEDAL AWARD: Richard L. Olson, center, president, Dike-O-Seal Inc., Chicago, is shown receiving the Gold Medal Diploma awarded by the 6th International Inventors Exhibition held in Brussels, Belgium, recently, for the originality of his method for sealing coreboxes and other cavitated assemblies. Presenting the award is Otto A. Witt, right, representative of the Exhibition. J. E. Olson, trustee of Dike-O-Seal Associates, agents for Dike-O-Seal in areas other than the American continent, is at left watching the presentation.

A TELEVISION FIRST: Peerless Foundry Co., Cincinnati, became the first gray iron foundry to show its facilities in operation to visitors through the medium of closed circuit television. Four "tours" a day were broadcast from the foundry to a booth at the Cincinnati Music Hall during the recent AFS Castings Congress. Left to right are Stephen F. Dana, president; Harry Placke, plant manager; Judy Brink, daughter of Ben G. Brink; Ben G. Brink, secretary, and Arvin Terry, sales, all of Peerless Foundry Co., who welcomed guests at the company booth.

DISTINGUISHED SERVICE: University of Wisconsin proudly presented distinguished service citations to four of its outstanding alumni at a recent Engineers Day celebration. The four men are sons of Charles Sumner Slichter, dean of the UW Graduate School from 1920-1934. Shown here flanked by Kurt F. Wendt (left), dean, College of Engineering, and President E. B. Fred (right), the four Slichter brothers, left to right, are Donald, vice president, Northwestern Mutual Life Insurance Co.; Allen, president, Pelton Steel Casting Co.; Louis B., director, Institute of Geophysics, University of California, and Sumner H., Lamont University Professor, Harvard University.

CREAM OF THE CROP: Four apprentices from the Milwaukee area were winners in the AFS national apprentice contest. The Wisconsin AFS chapter honored the winners at its Old Timers and Apprentices Night program recently. Left, left to right, A. F. Pfeiffer, chairman, apprentice committee, presents awards to Eldon C. Willing, Waukesha Foundry Co., third, steel molding; Raymond J. Hollfelder, Zenith Foundry Co., first, iron molding; Arnold L. See, Waukesha Foundry Co., first, steel molding, and Ralph W. Tolle, Waupaca Foundry Inc., third, iron molding.

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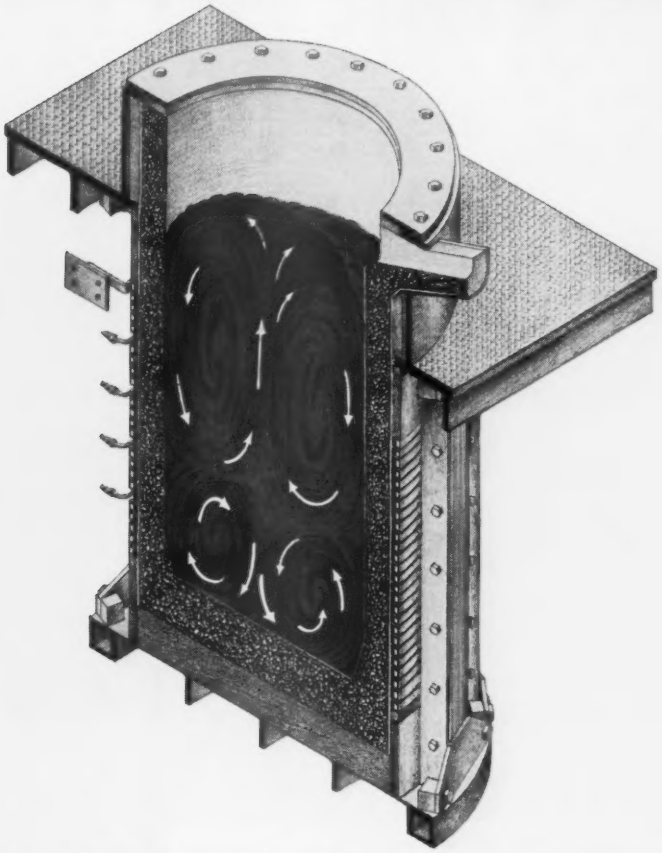

- A cylindrical induction coil supplied with ordinary 60 cycle current induces heat and vigorous electromagnetic stirring in the molten metal charge.

  Integrated electric controls regulate power, maintain high power factor automatically.

  Monolithic refractory linings are made by ramming against the sturdy water-cooled coil held in a rigid frame of magnetic and structural steel.

  This new principle was perfected in Europe over the last seven years. Over 100 Junker furnaces are now in use. AJAX-JUNKER designs are based on latest experience, using American components and practices throughout.

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  DUCTILE and ALLOY IRON CASTINGS
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  Available sizes range from 1 to 10 tons, with normal melting cycles from 2 to 4 hours. Power ratings are 200 kw through 1500 kw.

AJAX USA

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ENGINEERING CORPORATION

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Chemically-Bonded Brick Used for Cupola Lining

Various Economies Seen For Silica Refractory

*By D. R. Jones and J. C. Ekedah

THE relatively short life of refractory linings in the cupola melting zone has bothered generations of foundrymen, and until recently few improvements have been made. Probably the reason nothing was done about it for so long was that the cost of refractories and labor per ton of iron melted was relatively low. Since World War II these costs have risen sufficiently to create a demand for improved methods and materials for patching the cupola.

The air-placement method of refractory application has been the most widely adopted improvement in cupola patching in recent years. This method requires the foundryman to replace only the melted-out portion of the lining, thereby saving that part of the lining formerly removed to make room for a new brick or block. The wide use of monolithic linings has largely replaced the use of cupola block except for major rebuilding or relining, or in those foundries where fire clay cupola block or firestone are preferred.

In spite of this trend away from cupola block, a new type of cupola block has been developed to reduce the amount of patching ordinarily required. This new block or brick is an unfired, chemically-bonded silica refractory. It consists of crushed quartzite in two screen sizes, plus enough silica flour to fill the voids. The silica is mixed with a specific amount of the bonding agent and pressed into standard 9-in. brick shapes, or standard 9 x 6 x 4-in. universal-shaped cupola blocks by means of a power press. The brick or block then are dried until a strong chemical bond is formed.

The dried brick or block have the following physical characteristics upon removal from the drier. Listed for comparison are the same properties for fire clay (the most com-

	Chemically-Bonded Silica Brick	Intermediate-Duty Fireclay Brick	Burned Silica Brick
Bulk density, oz/cu in.	1.21	1.24-1.34	1.01-1.08
Apparent porosity, per cent	15	10-25	20-30
Modulus of rupture, psi	1000	600-2200	400-1200
Cold crushing strength, psi	4000	1200-6000	1000-3000

*Illinois Clay Products Co., Joliet, Ill.

Circle 649 on Inquiry Card—Page 51

monly used type) and burned silica brick.

At elevated temperatures, the chemical bond temporarily becomes pyroplastic (viscous). As the temperature rises, this pyroplastic matrix crystallizes to form a higher-temperature ceramic bond. The formation of a liquid phase during this conversion from a chemical to a ceramic bond is important in relieving the stresses set up by the expansion of the silica. Also, the liquid formed at these temperatures will partially fill available pore space, and thereby reduce porosity.

The expansion that occurs when the brick or block are heated will tend to weaken the chemical bond. Therefore, in order to develop maximum strength, it is essential that the temperature to which the brick is exposed is high enough to form the ceramic bond. For this reason, the use of the chemically-bonded silica brick or block is not recommended in the cupola above the melting zone where temperatures are likely to be insufficient to develop a ceramic bond. For much the same reason, these bricks are not recommended for use in water-cooled cupolas.

How Silica Compares as Refractory

Fundamentally, silica, as a refractory, has certain advantages and disadvantages when compared with fire clay. Its melting point of approximately 3100°F may be less than that of fire clay in some instances, but silica will remain strong and rigid to a temperature almost equal to its fusion point. Fire clay, on the other hand, has a melting range of 2900-3250°F, and will begin to soften and lose its strength at about 2600°F. Although this softening phenomenon may occur only in the first half-inch of the hot face of the brick, it tends to make that part of the fire clay brick vulnerable to mechanical erosion by the charge and chemical erosion by the slag.

Preburned silica brick have proved less satisfactory in the cupola melting zone than fire clay brick, monolithic materials, or chemically-bonded silica brick because of their relatively high porosity. Linear expansion of silica brick due to the transformation of quartz to cristobalite and tridymite during firing is about 3.5 per cent. Expansion of the chemically-bonded brick, on the other hand, occurs in service where the dual-liquid phase absorbs some of the stresses set up by expansion and also seals some of the pores developed during the expansion. Fire clay

Profitable Trends in the use of Refractories

Photos courtesy of Atlantic Steel Company

New furnaces start right with Laclede-Christy Refractories

Specifications on Atlantic Steel Company's new 13″ Bar and Rod Mill included a 90 ton per hour reheating furnace. They called on a leader in the field, Rust Furnace Company, to build it. Rust's experience and knowledge prompted their use of Laclede-Christy refractories.

The installation included Spallac super-duty fire brick which has proved its long-lasting qualities in other installations . . . requiring minimum maintenance and reducing downtime. Spallac super-duty features high refractory value, good volume stability, and high resistance to spalling. Also included was Laclede King high duty brick.

To start your furnace right—for new or replacement installations, it pays to use Laclede refractories. Call Laclede-Christy Works, Refractories Division, H. K. Porter Company, Inc., St. Louis 10, Mo.

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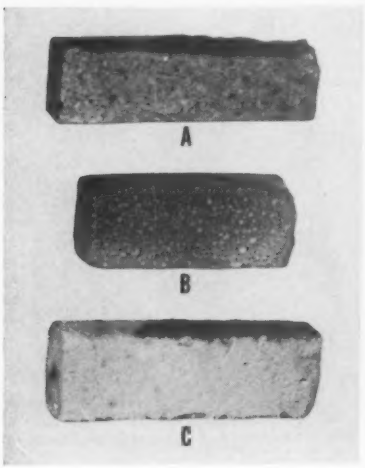
brick generally have less porosity than silica brick, but, because of their lower softening point, the effect of their lower porosity in preventing wear on the lining is nullified.

The accompanying picture of slag-attacked brick illustrates the previously discussed physical properties and their relation to service results. Samples (A) fire clay brick, (B) burned silica brick, and (C) the new chemically-bonded silica brick, were cut from commercially produced brick. An equal amount of the same cupola slag was placed on each specimen. These specimens were then heated together in a laboratory furnace to 2700°F and held at that temperature for six hours. The specimens then were cut in half. It will be noted that the fire clay brick was eroded by the slag, but that the slag did not penetrate deeply into the brick. The burned silica brick was deeply penetrated by the slag, and the slag also eroded out a large part of the smaller grains, leaving a porous weak structure. The chemically-bonded silica brick, on the other hand, showed no penetration or erosion by the slag, and the structure was extremely sound.

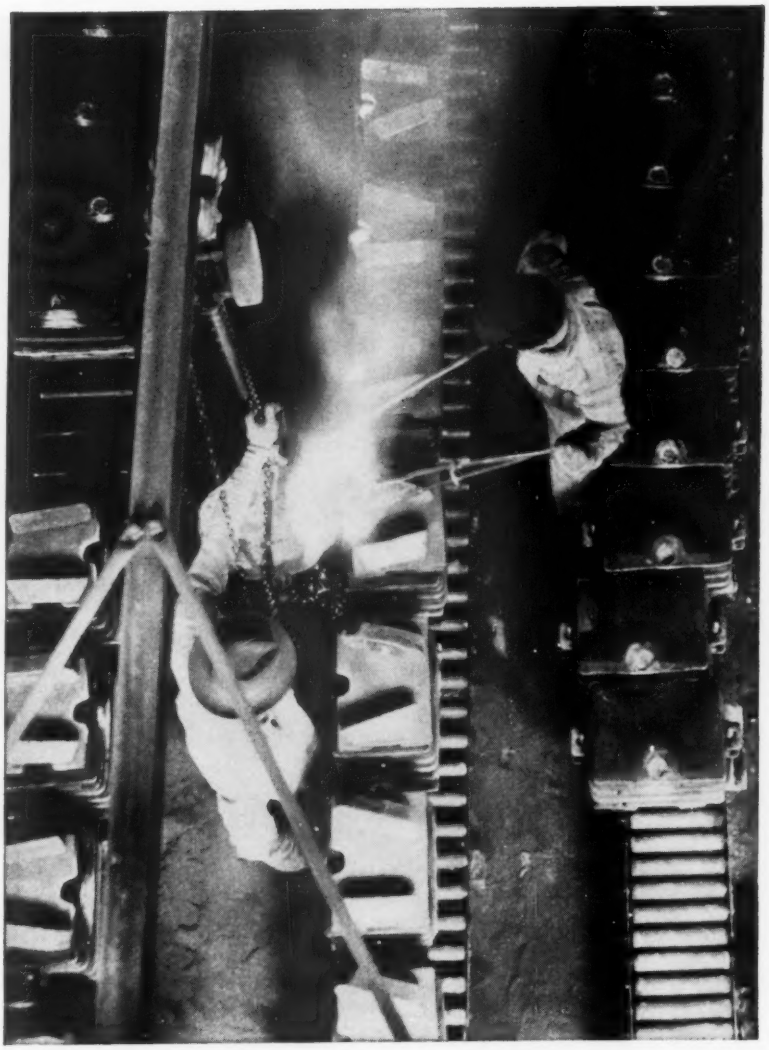


The advantages of chemically-bonded silica brick in lining the cupola melting zone are:

1. Reduced erosion with correspondingly less patching the next day. The result is a saving in labor and materials. Some users eliminate all patching for a period of 5 to 8 working days or longer.

2. Cleaner operation of the cupola with tuyeres remaining open throughout the heat, thus providing more uniform melting conditions.

3. No mortar necessary for installation, which means a faster and cleaner repair job. No preheating is



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necessary to dry out the lining.

4. No installation machinery is needed, and no loss of material in making installation. (This is true of any lining material other than air-placed refractories.)

To obtain maximum service in the cupola with chemically-bonded silica brick, a few simple precautions should be followed:

1. They should be installed only in the high-temperature zone which coincides approximately with the area of most severe erosion. It is customary to line about eight to ten blocks high beginning at tuyeres. The temperature in this area will insure the proper development of a ceramic bond. Above this area, the chemically bonded brick would not get hot enough to develop a ceramic bond.

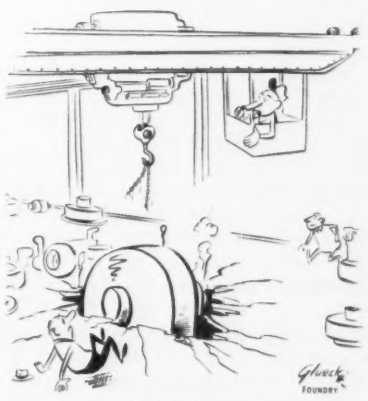
2. Do not preheat or dry out a new lining of chemically bonded silica block. The high reversible expansion characteristics of silica at temperatures up to 1400°F make this practice undesirable. The cupola may be charged immediately after installation of the block. This ability to operate without delay is often an advantage as a time saver.

3. Allow ¼-in. space, free of mortar, between each block vertically to accommodate expansion of the silica. One-half to one inch of fire clay or insulation behind the block is helpful as a cushion, and as a means for promoting deeper vitrification.

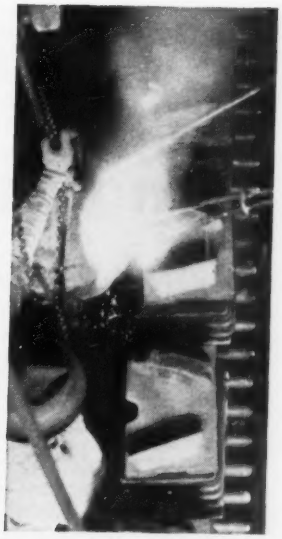
4. Do not hose down lining with water after dropping the bottom.

Michigan Oven Appoints Dealer

Michigan Oven Co., Detroit, has appointed the Brandwine Equipment Co., situated in St. Louis and Kansas City, Mo., to handle its line of industrial oven systems in the area around each of the two cities.



"Oops, Sorry!"



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Management Development Discussed at

AFS Castings Congress

Here are concluding reports on technical sessions of the recent AFS Congress. Reports in the June issue covered Patternmaking, Malleable Iron, Steel, Statistical Methods, Malleable Shop Course, Safety and Hygiene, Core and Molding Sand and Fundamental Papers

THE newly formed Management Development Committee of the American Foundrymen's Society presented its first program at the recent Castings Congress in Cincinnati. In opening the session, C. E. Westover, Westover Corp., Milwaukee, and chairman of the committee, said that its objective is to help in the education and development of present and future foundry managers and supervisors.

Programs to be presented at conventions will be designed to supply information on management's problems and functions in areas other than those of production. The committee also expects to present programs at regional and chapter meetings of the society.

Speaking on "Development of Foundry Management," William J. Grede, president, Grede Foundries Inc., Milwaukee, stressed the fact that success or failure of the operation of the industry depends upon the quality of management. If given a good engineering and metallurgical staff and the technical know-how, management has the problem of coordinating those abilities and talents with customers' requirements so that the result will be to serve the market, with profit to both the customer and the producer of castings.

Quality of management is one of those intangibles that is difficult to define. In considering these qualities, Mr. Grede pointed out that he was not referring to just the details of the accounting technique as related to record-keeping, cost-keeping, or even the function of the controller, but rather to the over-all skill and technique that seems to make an industry or a company tick. This calls for the highest degree of understanding of people and the atmosphere or climate in which they work.

Mr. Grede recommended to the committee that it not compete with the so-called management associations of various kinds in the development of programs and techniques for and by management, but that it concentrate on the education of those people who are now coming to AFS meetings. The annual convention is the greatest gathering of foundry scientists and engineers, and it seems important that the society develop in them a better understanding of the field of management and a better understanding of the philosophy that is behind the free competitive economy and political structure in which the American management has been so successful.

No corporation, Mr. Grede pointed out, ever produced a pound of steel or a dime of profit. People do that—individual, important, significant people. No government ever produced a job nor can it produce economic security. People do that for themselves.

While we have learned to work together in co-operation with large groups, the important decisions in every-day life are still made and must continue to be made by individual people. Any program that makes the individual in the exercise of his personal responsibility and his individual ingenuity subversive to the will of the group, violates our American tradition and our entire concept of freedom. Therefore, if we are to develop the kind of management people we find so essential to the successful operation of the foundry industry, it is necessary to recognize in all people that are associated with the industry, their significance as persons.

EDUCATION

AT THE first of two sessions sponsored by the Education Division, a report on future training needs of jobbing foundries was presented by J. S. McCauley, United States Department of Labor, Washington. This report, based on a survey conducted by the Department of Labor with the co-operation of industry, is presented in full starting on Page 110.

Foundry Instructors Seminar—Three speakers appeared at the second and concluding education session. W. H. Ruten, Brooklyn Polytechnic Institute, Brooklyn, N. Y., described the purpose and nature of the AFS Foundry Instructors Seminar, the first of which was held last summer at Michigan State University. About 100 persons from eight states and Canada attended the 2½-day program. The teachers present were chosen by AFS chapters, which paid most of their travel expenses, and facilities were provided by the AFS.

Speakers at the seminar explained the technical status and manpower needs of the foundry industry, and kits were distributed to enlarge on these subjects. A trip was made to the Saginaw foundry of Central Foundry Division, General Motors Corp., and was followed by a question-and-answer session. An evaluation session at the close of the seminar was held to help chart the organization of future meetings.

Teachers who had attended were enthusiastic about the program, and it is felt that such good will helps the foundry industry to get good employees. The second such seminar was held June 20-21, also at Kellogg Center.

Training & Research Institute—S. C. Massari, technical director, AFS, explained the objectives of the AFS Training & Research Institute, which was established last year and will get into operation during 1957. It was felt that many capable, ambitious men already in the foundry industry lack the opportunity to get technical training that would help them to do a better job. The institute is designed to give them that opportunity. It will offer intensive one-week courses in specific aspects of foundry operation. Both lecture and laboratory work will be offered. Authorities will explain the technical backgrounds of such operations. Tuition will be $120 per course.

Research activities will be secondary. They will use equipment required for the training programs, thus providing efficient utilization of equipment. Three courses are contemplated this year. They will deal with industrial engineering, sand testing and cupola operation and will be presented, respectively, in Milwaukee, Detroit and Chicago. This sort of program will be conducted temporarily until the construction of the institute on vacant land adjacent to AFS headquarters in Des Plaines, Illinois, near Chicago. Selection of an architect to design the institute has been authorized by the trustees of AFS.

Chapter Activities—Emil J. Romans, National Malleable & Steel Castings Co., Cleveland, discussed educational activities of Northwestern Ohio Chapter of AFS, for which he served during 1956-57 as second vice chairman and educational committee chairman.

Mr. Romans recommended a large educational committee which could be subdivided into smaller groups, each of which should be given a specific job to do. A successful program requires good people, good planning and effective co-ordination.

At Northeastern Ohio Chapter, a large and varied program was conducted successfully. A gating and risering symposium sponsored at Case Institute of Technology attracted a total attendance of more than 600 on four nights. A television program on light metals casting was presented on a Cleveland station as part of a series offered by the local council of engineering societies to which the chapter belongs, and received a high viewer rating.

A three-day Dietert Sand School course, presented by Victor Rowell,

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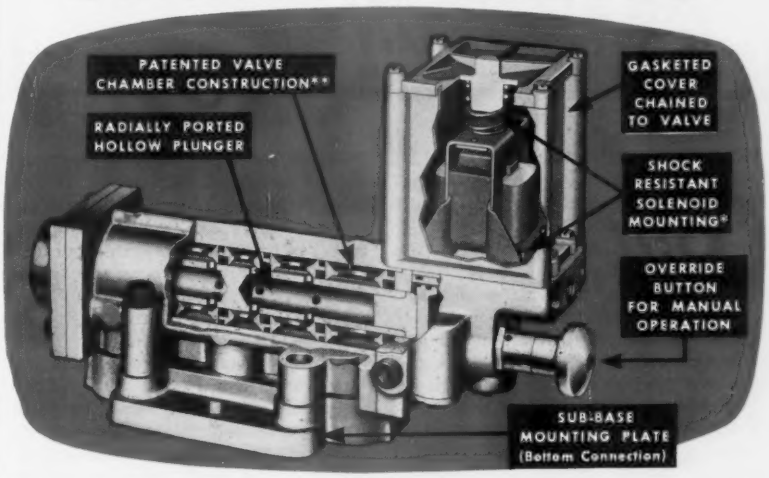
PATENTED VALVE CHAMBER CONSTRUCTION**
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5) **PATENTED VALVE CHAMBERS** are formed by aluminum spacers in accurate metal to metal end abutment** that hold the "O" rings and "U" packers in exact position, and supported on both inside and outside diameters, without mechanical pressure. This proven construction permits repacking easily, quickly and accurately in the field.
6) **OVERRIDE BUTTON** permits manual operation in case of power failure.

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*Patent Applied For **U. S. Patent 2,645,450

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Harry W. Dietert Co., Detroit, also attracted hundreds of foundrymen. Each day was presented as a unit complete in itself. Members of the educational committee spoke to 950 high school students, showed them a film on opportunities in metals casting and distributed copies of the AFS booklet *The Foundry Is a Good Place To Work*. In addition, the chapter worked closely with local Foundry Educational Foundation students, took part in the annual AFS apprenticeship contest and distributed copies of *The Development of the Foundry Industry* to local schools.

GRAY IRON

THREE TECHNICAL SESSIONS and a luncheon made up the Gray Iron Division program and covered a variety of topics. Papers were presented on such subjects as inoculation, use of tin as an alloy, carbon refractories, gating, feeding of nodular iron castings, risers, microstructures, temper embrittlement in nodular iron, nickel-alloyed nodular iron and gray iron casting design.

Inoculation of Gray Cast Iron—by N. C. McClure, Dow Chemical Co., Midland, Mich.; A. U. Khan, Whirlpool & Seeger Corp., St. Joseph, Mich.; and D. D. McGrady and H. L. Womochel, Michigan State University, East Lansing, Mich. Presented by Mr. Womochel.

Many theories, most of them based on a nucleation mechanism, have been advanced regarding the mechanism of inoculation. None of these theories seems capable of explaining all observations relating to the inoculation phenomena. Conclusions of this report are based on experiments with high-strength, indirect-arc electric furnace irons. Relatively low-carbon, high-strength irons were used because of their tendency toward unfavorable graphite distribution and their sensitivity to inoculation additions.

Specific conclusions based on these experiments include the following: In spite of the common feeling that silicon is the most essential and active agent in inoculating alloys, silicon is not effective as an inoculating agent. Silicomanganese, relatively free of calcium and aluminum, was not effective. The inoculating ability of various commercial grades of ferrosilicon increased with calcium and aluminum contents. Silicon-manganese-zirconium alloys containing somewhat more calcium than commercial ferrosilicon were more effective than ferrosilicon.

The most effective inoculant for the improvement of mechanical properties in these experiments was calcium-silicon alloy with approximately 30 per cent calcium. Metallic calcium additions to the ladle brought about marked improvements in mechanical properties and graphite distribution. Calcium was superior to all other agents but calcium-silicon. Metallic calcium was effective in reducing chilling tendency. Calcium was effective in reducing cell size and effected a reduction in the carbon content of molten iron by formation of a carbide of low solubility. Although aluminum was a powerful chill reducer, its addition did not promote Type A graphite distribution.

Tin as a Useful Alloy in Gray Iron—by J. A. Davis and H. W. Lownie, Battelle Memorial Institute, Columbus, and D. E. Krause, Gray Iron Research Institute, Columbus. Presented by Mr. Davis.

Although tin in the past has been regarded almost universally as an undesirable element in iron and steel, and has been considered to have an embrittling effect on gray iron, the judicious use of tin makes possible fully pearlitic matrix microstructures in gray iron, with a high degree of predictability and control. The pearlitic microstructure is highly desirable for many applications, especially those involving high resistance to wear combined with a need for good machinability.

Tin additions did not show objectionable tendencies to promote chill depth and did not cause massive iron carbides to form in the matrix. The optimum amount of tin necessary to produce a completely pearlitic microstructure was governed by the amount of ferrite in the base iron before the tin was added.

Tin contents of 0.10 per cent or less resulted in all cases in slightly improved mechanical properties. No embrittling effects of tin were found at levels up to 0.10 per cent. Experiments were not conducted on the effects of tin on wear resistance or machinability of gray iron.

Carbon Refractories — by G. B. Tatum, National Carbon Co., Division of Union Carbide Corp., Cleveland. Use of carbon as a cupola lining material stems from its success as a blast furnace lining. Carbon linings have lasted as long as ten years and stayed in good condition. Chemically neutral and possessed of a low coefficient of expansion, carbon is especially suited for application in the well zone of a cupola. It is resistant to slag attack. Brick, block

J. S. McCauley, U. S. Department of Labor, right, reported at an education session on a survey of foundry manpower needs made by his department with the co-operation of a foundry industry advisory committee headed by F. G. Sefing, International Nickel Co., standing. Peter E. Rentschler, Hamilton Foundry & Machine Co., left, is one of the members of the industry advisory committee

and paste forms are available. Carbon has been used in melting zones of cupolas and in malleable melting units, but not enough data are available yet to permit discussion. For more details and for information on construction of carbon linings, see "Lining Cupolas with Carbon," FOUNDRY, January, 1956, p. 184.

Gating of Gray Iron Castings—by J. F. Wallace and E. B. Evans, Case Institute of Technology, Cleveland. Presented by Prof. Wallace. Report describes results of an evaluation of existing literature on gating and risering of gray iron. Purpose is to describe a gating system that will produce highest quality castings compatible with reasonable economic considerations. A report on risering will be made later.

Establishment of a gating system for gray iron casting requires these specific steps: 1. Selection of an optimum pouring rate or time. 2. Design of a gating system that will provide the selected pouring time and comply as closely as possible with the following eight characteristics:

1. Mold filled rapidly, without laps or excessively high pouring temperatures.
2. Agitation and formation of dross in the mold reduced or prevented.
3. Slag, scum, dross and eroded sand prevented from entering the casting through the gating system.
4. Aspiration of air or mold gases into the metal stream be prevented.
5. Mold and cores not eroded.
6. Suitable thermal gradients obtained to attain directional solidification and to minimize distortion in castings.
7. Maximum casting yield and minimum grinding costs.
8. Pouring done as easily as possible, utilizing available ladle and crane equipment.

Feed Metal Requirements for Nodular Iron Castings—C. C. Reynolds, J. Maitre and H. F. Taylor, Massachusetts Institute of Technology, Cambridge, Mass. Presented by Prof. Reynolds. Nodular iron castings remain a mixture of liquid and solid throughout most of the casting during the entire solidification time, resulting in gross and sponge-type shrinkage. Precipitating graphite is beneficial in lowering feed metal requirements. If it is present in sufficient amount, many castings can be made in rigid molds, without risers. The main effect of increased silicon is to allow more graphite to precipitate because of the decreased solubility of carbon in austenite.

Because of the mushy-type freezing, mold cavity deformation is important. Feeding requirements are minimized in a rigid mold, such as

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one made of cores or dry sand. Sponge-type shrinkage in heavy sections can be avoided by having the percentage of total carbon plus one-seventh of the percentage of silicon equal to or greater than 3.9. For castings made in nonrigid molds, the larger the section, the greater the mold deformation and the shrinkage.

Risers for Sand Casting—by Richard Namur, Fabrique Nationale d'Armes de Guerre, Herstal, Belgium. This paper, the official exchange paper of the Association Technique de Fonderie, Belgium, originally was to be presented by title only, but was discussed briefly by H. W. Lownie, Battelle Memorial Institute, Columbus, O. It is a theoretical paper on determining risers for all types of metal castings. Highly mathematical, it will require further study.

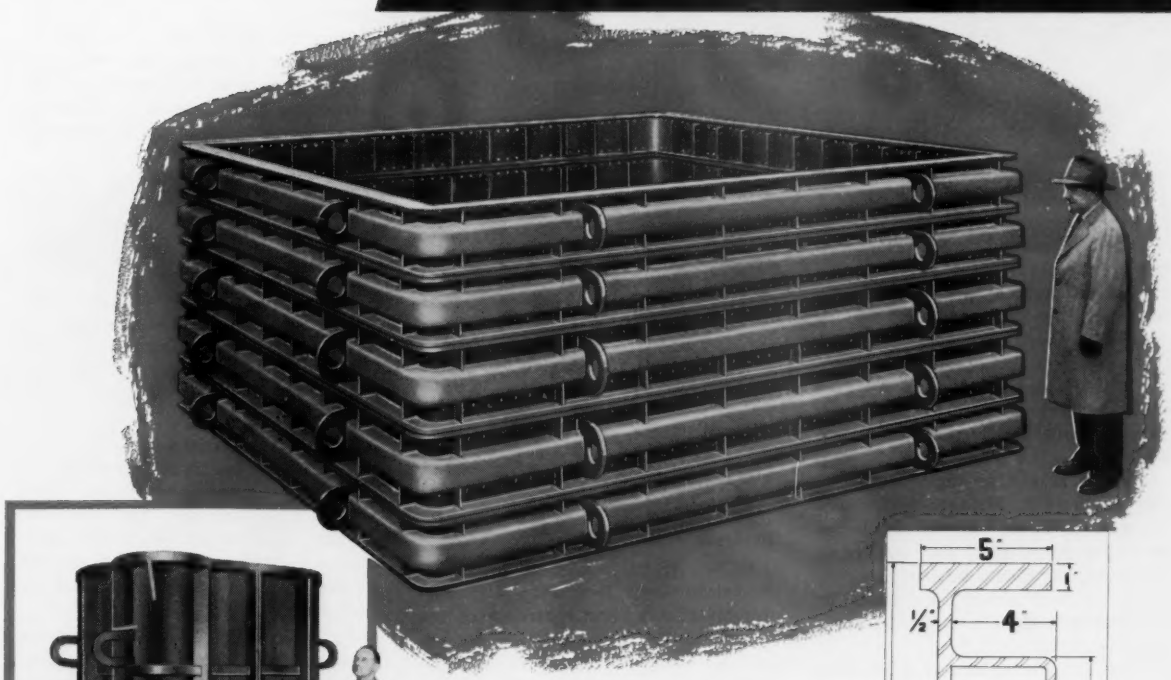
The report of the joint AFS-AWS committee on welding cast iron concluded this session. The committee was organized in 1954 to determine the accuracy of specifications which said that iron castings should not be welded.

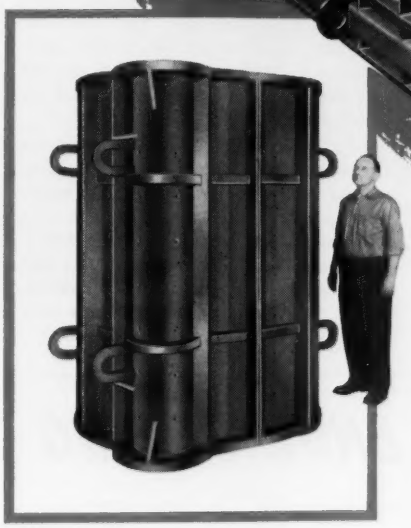
R. B. Fischer, Ingersoll-Rand Co., Phillipsburg, N. J., described the **Preparation, Testing and Inspection of Weld Material.** Disc-type gray iron and nodular iron castings were used to make test bars. They were prepared by Ingersoll-Rand Co. after an Allis-Chalmers prototype.

Summary of Progress in Welding Gray Iron—Sidney Low, Chapman Valve Mfg. Co., Indian Orchard, Mass. For Class 30 irons, ENiFe manual metallic electrodes are recommended, at the voltage and amperage stated by the manufacturer. Other recommendations include use of stringer or narrow weave, short bead length and 300 to 500°F preheat. For depths to 1 in., the included angle should be 30 to 60 degrees; larger depths can have a smaller angle. Defects should be removed, and such inspection as magnetic particle or x-ray should be used. These electrodes will produce welds as strong as the base metal. Oxyacetylene welding with filler rods is thought to be promising, but there is no fusion with thermit welding. Further investigations will cover effects of various means of preparation for welding, a search for more useful test blocks and the nature of an optimum preheat temperature for cast iron.

Report on Progress of Malleable Iron Program—S. T. Walter, Air Reduction Sales Co., New York. Test blocks used were similar to the gray iron blocks and were prepared by Eberhard Mfg. Co. It is felt that promising results can be obtained in welding malleable iron. The best so

fourteen feet square . . .





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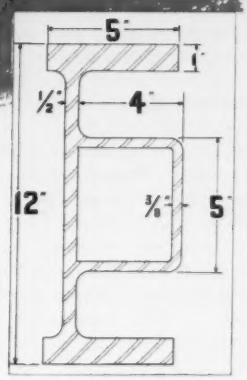

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far have been with arc welding, oxyacetylene arc and brazed welding. The committee is not yet ready to recommend specific techniques.

Report on Nodular Iron Program —Walter Edens, Allis-Chalmers Mfg. Co., Milwaukee. Again, the test bars used were similar to those employed by the gray iron group. Forty per cent of nodular welds were found strong enough to be tested. The chief problem in welding nodular iron is in the fusion zone, where there is danger of making white iron because of the high carbon content. Preheat has to be maintained throughout the welding operation at 1100°F and should not go below 1000°F before the part goes into the annealing oven. A clean groove, use of flux and other standard good welding practices are important. All these points apply to oxyacetylene arc welding.

Preheat is not so important with arc welding. A stringer-bead technique with some weaves should be used. Stress relief in full ferritizing anneal is a problem, but encouraging results were obtained. Good leads for the development of a successful technique were achieved.

Third gray iron session dealt with nodular cast irons. First paper, **Temper Embrittlement in Nodular Cast Irons,** was authored by G. N. J. Gilbert, member of research staff, British Cast Iron Research Association, Birmingham, England. In his absence, it was presented by J. Keverian, General Electric Co., Schenectady, N. Y.

It was pointed out that nodular cast irons and blackheart malleable irons with relatively high silicon and phosphorus contents may become embrittled when quenched from the temperature range 662-1112°F. Maximum embrittlement occurs in irons quenched from 842 to 932°F. This embrittlement is well known in the blackheart malleable industry because in susceptible irons it occurs when they are galvanized.

Among numerous conclusions arrived at by the author are that the susceptibility of nodular and malleable cast irons to temper embrittlement is increased by additions of phosphorus and silicon, but phosphorus is much more effective than silicon; also, addition of molybdenum to an otherwise susceptible composition inhibits the embrittlement obtained after a given treatment at 842°F in irons previously quenched or slowly cooled from 1202°F.

In the second paper, C. R. Islieb and R. E. Savage, International Nickel Co., Bayonne, N. J., discussed **Nickel Alloyed Normalized Ductile Irons.** The authors studied a wide range of compositions since the knowledge obtained would provide help in selecting the material best suited for given applications. Carbon, silicon and manganese were held constant. Nine compositions were used—three were of nickel and molybdenum, and one was of nickel, molybdenum and vanadium. The base was 3.4 per cent total carbon, 2.6 per cent silicon, 0.25 manganese, and 0.035 per cent magnesium. Nickel ranged from 0.03 to 0.06 per cent and vanadium was 0.2 per cent.

Conclusion reached by the authors is that for all section sizes there is a simple relationship between chemical analysis and physical properties desired.

Economical Casting Design and Production was the topic on which attention was focused at the gray iron roundtable luncheon. Speaking on this subject was G. W. Schuller Jr., superintendent of pattern shop, Caterpillar Tractor Co., Peoria, Ill.

C. K. Donoho, chief metallurgist, American Cast Iron Pipe Co., Birmingham, Ala., and chairman of the Gray Iron Division, presided. He announced that his successor as division chairman would be Harold W. Lownie Jr., assistant supervisor, Battelle Memorial Institute, Columbus, O. New vice chairman will be Ralph A. Clark, Detroit district manager, Electro Metallurgical Co., Division of Union Carbide Corp., New York.

Mr. Schuller pointed out in his introduction that the early foundryman had to make his own patterns and perform all foundry duties. Today is an age of specialists. An engineer may design a casting that will serve its purpose well but which is uneconomical in its making. Neither the cheapest method nor the most costly is necessarily the best.

The speaker made a plea for an exchange of ideas between engineers and designers and foundrymen. How is good design accomplished? Recognizing that most engineers are not familiar with foundry practice, Mr. Schuller answered that question by giving the following hints: (1) Plan for a sound casting; (2) Plan for moldability; and (3) Plan for minimum costs.

It was emphasized that the patternmaker must have knowledge of foundry practice and know what shrink rules to use. And all concerned with production of the castings must keep aware of the interest of the machine shop in its need for uniform hardness.

In commenting on Mr. Schuller's presentation, Charles F. Walton, technical director, Gray Iron Founders' Society Inc., Cleveland, agreed that the foundryman should seek to simplify, but it must not be forgotten that if a customer wants a certain casting, that casting must be made for him.

INDUSTRIAL ENGINEERING

FOUNDRY layout, materials handling, motion-time study and production methods were some of the topics discussed at two well-attended sessions on industrial engineering.

In a paper, **Improving Foundry Layout** — R. B. Sinclair, Meehanite Metal Corp., New Rochelle, N. Y., pointed out that a well-arranged foundry should provide an uninterrupted flow of materials through the plant so that castings can be produced economically. By making detailed plan drawings of the foundry to show exact locations of every piece of equipment, and then superimposing a flow diagram, it can be determined whether or not materials flow without interruption. The author showed numerous illustrations of the procedure, and how changes were made to provide better facilities for castings' production.

Materials Handling in the Foundry —R. A. Petersen, Pangborn Corp., Hagerstown, Md. This report was a detailed description of the method employed in selecting suitable equipment for handling all materials in a small foundry. A motion picture, **Value of Standard Data,** prepared by John Deere & Co., Moline, Ill., was presented by Robert Trennel. It showed the various steps in setting up standard data through time and motion study using motion picture filming of the operations.

An Appeal To Foundry Executives —J. A. Wagner, president, Wagner Malleable Iron Co., Decatur, Ill. It is important for top management to see that costs are properly accumulated by the accounting department, if benefits are to be derived from improved equipment and methods. Mr. Wagner outlined some of the factors involved in acquiring adequate knowledge of costs, the need for an oper-

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ating budget which would form the basis for a cost-finding budget, and the importance of proper understanding of equipment depreciation.

Any company which mechanizes to any extent should recognize that the reduced labor cost in the operation affected must be offset by the depreciation of the new asset, the power to run it and the maintenance expense of keeping it running. These cost factors should be considered when deciding whether purchase of a piece of equipment is justified.

For the industry to capitalize on the potentials of the castings market, it seems that much money for modernization is needed. Poor quality and antiquated manufacturing methods, coupled with poor working conditions and high costs, will not capture these potential markets. It is high time that we asked ourselves whether our castings are being priced by adequate and proper cost considerations.

Use of Memomotion in Setting Foundry Standards—L. L. Randolph, American Steel Foundries, Granite City, Ill. This paper described particularly the use of motion pictures in setting work standards for a sand-slinger operation involving 23 or 24 men in the production of side frame molds. The camera recorded operations at the rate of one frame per second. Ten time-study men were assigned to the job. Pace determinations on each worker were made by a number of different time-study men; this arrangement helped to give a representative figure.

The films were analyzed the same as a regular time study, as far as the elements are concerned, but instead of watch readings as an element, the counter readings or frames which come directly from the counter on the projector were used. This system offers the advantage of filming large groups at the same time, thus making it unnecessary to take different men of the same group at different times. It also provides a permanent record in such detail for each worker that method analysis can be made at a later date as desired.

BRASS and BRONZE

FOUNDRYMEN interested in brass and bronze subjects participated in four sessions and a breakfast.

Pressure Tightness of 85-5-5-5 Bronze Castings—R. A. Flinn, University of Michigan, Ann Arbor, Mich. Research was conducted on 1/32-in.-thick samples cut horizontally from the center of 2 x 2 x 12-in. long castings. Samples had planed surfaces and were tested in a chamber designed so that nitrogen at pressures up to 1000 psi can be forced against one side of the sample.

Findings show that if a casting leaks it will leak at any pressure. Leak rate, however, is proportional to pressure from 25 to 1000 psi. The densest metal lies farthest from the riser, and chilling will give more metal that is leak-tight.

Fracture Characteristics of Copper-Base Alloys—N. C. Howells and E. A. Lange, Naval Research Laboratory, Washington. Presented by Mr. Lange. Fifteen Navy copper-base alloys were investigated with drop-weight and Charpy V tests at temperatures between 210°F and −300°F. Such alloys have fracture characteristics different from steel in that a Charpy V energy level of 10 ft-lb does not indicate a brittle condition. With Charpy V energy values from 3 to 10 ft-lb, copper-base alloys will deform plastically even when they contain a sharp notch.

A general interrelationship exists between Charpy V energy, tensile elongation and notch ductility for these alloys. The alloys will fracture in a brittle manner when they have a tensile elongation value below 2 per cent. However, high-tensile manganese bronze approaches a brittle condition at temperatures below −150°F.

For its second session, the Brass and Bronze Division held a clinic on **Castings Defects.** Panel members were G. F. Watson, American Brake Shoe Co., Mahwah, N. J.; R. A. Colton, Federated Metals Division, American Smelting & Refining Co., Newark, N. J.; and F. L. Riddell, H. Kramer & Co., Chicago. R. B. Fischer, Ingersoll-Rand Co., Phillipsburg, N. J., was moderator.

Mr. Watson reviewed defects caused by metal-mold reaction. Many casting defects are attributed to gases since the same gases are present in the mold as are found in melting. These defects are either pinholes or spheroids, the latter ranging from 1/32 to ⅛ in. in size. Unfortunately, the pinhole and spheroid defects are concealed in the metal and usually aren't discovered until the castings are machined.

The speaker pointed out that water used in bonding sand breaks down and hydrogen goes into the metal. Carbohydrates in cereals, starches, etc., also release hydrogen. In dry sand molds, carbon monoxide is blamed for gas trouble. Mr. Watson also discussed porosity resulting from metal-mold reaction, core gas, core blows, and inadequate venting in low-permeability sand. His recommendations were to use low moisture in sand, keep pouring temperature low and avoid dry binders.

In discussion, Harry St. John, foundry consultant, Fort Pierce, Fla., expressed belief that excess moisture alone in a mold will not cause pinhole porosity, although it may cause blowholes.

Mr. Colton considered defects due to design and commented that these are built in the patterns. Designers get what they want in a casting although the foundryman doesn't get what he wants. For example, draft on a pattern is a design matter, and the designer doesn't always know that metal shrinks. The problem is to educate the designer. The foundryman should be consulted before design is finalized. Mr. Colton admonished, however, not to design into a casting more than the casting needs to give.

Defects due to gating were covered by Mr. Riddell. Design, he said, frequently is not suited to the alloy. Considerations must be given to directional or progressive solidification, chills, insulation, placing of gates and risers at the right places, etc. There should be more contact between the designer and foundryman, he said, commenting that there is now very little of this in jobbing shops, although such co-operation is growing in big production foundries.

At the third brass and bronze session two exchange papers were presented. First was **Co-operation for Technical Advancement in the British Bronze Foundry Industry**—A. H. R. French, J. Stone & Co. (Charlton) Ltd., Charlton, England, and E. C. Mantle, British Non-Ferrous Research Association, Birmingham, England. It was the official exchange paper from the Association of Bronze and Brass Founders and was presented by R. W. Ruddell, Foundry Services Inc., Columbus, O. Paper described the co-operative activities of a trade and a technical association in advancing the industry.

Relation of Microhardness and Stresses in Copper Alloys—P. J. Le

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Thomas, Association Technique de Fonderie de France, Paris, was the official French exchange paper, and related to an investigation of some copper alloys which exhibited striations close to the fracture.

The carbon dioxide process was discussed at the brass and bronze roundtable breakfast held Friday morning. Those participating in the panel included John E. Gotheridge, Foundry Services Inc., Columbus, O.; C. T. Koehler, Hamilton Brass & Aluminum Castings Co., Hamilton, O., and B. N. Ames, Doran Manganese Bronze-Columbian Bronze Corp., Brooklyn, N. Y.

Mr. Gotheridge discussed the reactions involved in the process and pointed out that overgassing results in friable surfaces on molds and cores. That condition is indicated by appearance of a white incrustation, and by observance of the phenomenon it is easy to establish suitable gassing times to avoid overgassing. Sand and silicate binder should be mixed as rapidly as possible to prevent rapid air drying of the sand mix. The speaker said that sometimes lowering the muller wheels increases mixing action, and less time is required.

Some information on making small cores for valves, pumps and component parts was presented by Mr. Koehler. Control of sand is most important. Clay and fines should be held to the minimum. At present a sand with 100 AFS fineness with 4 to 7½ per cent proprietary binder is being employed. Use of too much binder causes veining in cores. Many of the cores used are blown on a conventional type machine using a vented top plate and a single blowhole. Hole size may vary from ½ to 1 in. in diam according to the size of the core. Difficulty from partially dried sand in the blowhole due to work stoppage of some kind is eliminated

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by first blowing a dummy core to clear the passage.

Mr. Ames described his foundry's practices in producing ship propellers of various sizes. Details are available in the February issue of FOUNDRY, Page 104.

Final brass and bronze session pertained to gun metal and cupro-nickel. **Effect of Geometry on Properties of Gun-metal (88-8-4) Castings, a Progress Report**—W. H. Johnson, Battelle Memorial Institute, Columbus, O., gave results of an investigation carried on at Naval Research Laboratory. The 88 Cu, 8 Sn, 4 Zn alloy in vacuum degassed and nondegassed conditions was poured into plates of various sizes in L, T and X shape form, and into separately cast test bars. Tensile strength and elongation were determined at various locations in the plates and other castings and compared with those of the separately cast bars.

Properties from edge to center sections of plates and edge to hot-spot sections of L, T and X castings varied from values higher to considerably lower than those of the test bar. Variations were greater in thinner than in thicker sections. Vacuum degassing did not always improve mechanical properties. Proper gating and risering, as well as application of chills to obtain directional solidification, is essential to obtain the same or better properties than are obtained in the separately cast test bar.

Production and Properties of Iron and Aluminum Alloyed Cast Cupronickel — G. L. Lee, International Nickel Co., Bayonne, N. J., provided information on a new alloy designed for service in marine and power installations. Conclusions given are that a 12 Ni-Cu alloy containing 1.5 Al, 1 Mn, 0.6 Fe and deoxidized with 0.05 each of P, Ti and Ca as CaSi, will have a tensile strength of 95,000 psi and is suitable for pressure and structural castings in severe marine corrosion conditions. A 12 Ni-Cu alloy with 1 Mn and 1.2 Fe will have a tensile strength of 45,000 psi and is suitable for pressure castings. Ample gating and risering practice with non-turbulent flow are necessary to produce sound pressure-tight castings. Lead should be kept out of silicon deoxidized bronzes.

HEAT TRANSFER

TWO SESSIONS were devoted to subjects relating to transfer of heat from metals and castings.

Some Generalized Solidification Studies, by Victor Paschkis and J. W. Hlinka, Columbia University, New York. This report, presented by Dr. Paschkis, dealt with the preparation of charts which depict the progress of solidification in certain castings and indicate the freezing time of various sections. The effect of mold temperature and material of the mold on time of solidification is to be the subject of a future report.

Temperature Drop in Pouring Ladles, by Victor Paschkis and J. W. Hlinka, and presented by Dr. Paschkis. This is the second part of a study first reported on at the AFS Congress a year ago. The original report was based on the assumption that the metal in the ladle is completely quiet. The latest study considers instances in which metal in the ladle is being agitated and the temperature is dropping uniformly. It is believed that the true temperature drop in ladles in foundry practice lies somewhere between the limits presented by the 1956 report, involving no mixing, and the present report.

Charts were presented showing 1) holding time vs. pouring temperature for ladles of 1 and 3 in. lining, 2) holding time vs. preheat temperature for ladles both with and without lids, and 3) ratio of unmixed holding time to completely mixed holding time vs. preheat temperature for various tapping temperatures, different sizes of ladles, and with and without lids. Importance of preheating time makes it desirable to use a pyrometer to be sure that the ladle is up to heat. Equilibrium is attained when temperature of the outside of the ladle, as measured by the pyrometer, no longer rises. It was pointed out in subsequent discussion, however, that in actual foundry practice temperature equilibrium rarely is attained, some steam being driven from the ladle after as many as three heats.

Transport of Feed Metal During Solidification of Tapered Steel Bars—C. M. Adams Jr. and H. F. Taylor, Massachusetts Institute of Technology, Cambridge, Mass., and E. J. Sullivan, Clifford Mfg. Co., Waltham, Mass. Presented by Dr. Adams. Research studies of padding requirements for cast, cylindrical, plain carbon steel bars indicate that convex parabolic distribution of padding metal produces castings in which shrinkage, if any, is distributed uniformly over the lengths of the bars.

Test castings 1 ft long, tapering parabolically from 1 in. in diam to 2.2 in. in diam at the risered end, were cast sound or nearly sound using steels containing 0.10 to 1.4 per cent carbon. Pure metals required much less padding than steel because of their smooth liquid-solid interfaces. Parabolic padding requires less metal by weight fraction for large-diameter bars than for small bars. Padding efficiency can be improved further by taking full advantage of the chill effect at the small end of the casting.

Flow of Heat from Sand Castings by Conduction, Radiation and Convection—C. M. Adams Jr. and H. F. Taylor, MIT. Presented by Dr. Adams. This study dealt with the conduction of heat from castings into

Shown from left to right, at the second of two gray iron shop courses, are D. E. Matthieu, D. E. Krause and W. W. Holden

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sand molds, and the radiation and convection of heat from the tops of open risers. Tests were conducted with a semispherical casting with a full-diameter, cylindrical extension on top. The design left only two unknowns for heat loss—conduction through sand with no angle or corner effects and through radiation from top of the casting. Copper, aluminum and tin were poured into green and dry sand molds.

Results indicate that under casting conditions the effective value of thermal conductivity depends only slightly upon moisture content of the sand or upon the melting point of metal poured. It also was determined that heat leaves the riser top at a constant rate and leaves through sand at an ever decreasing rate.

On the basis of findings, equations were developed for thermal calculations so that firm predictions of solidification rates and times might be made possible. Further work will be done on metals having higher melting points.

SAND SHOP COURSE

FIVE DISCUSSIONS of various aspects of sand practice were presented at the sand shop course. These talks chiefly covered the relationship of sand to casting defects, with emphasis on how good practice avoids the occurrence of those defects which are attributable to sand preparation.

R. E. Daine, Aluminum Co. of America, Cleveland, dealt with critical properties of molding sand. Since all properties of sand cannot be checked, it is necessary to select those which are critical. The first are sand fineness and distribution, which should be checked on all incoming sand.

With control over the type of sand established, the next step is to check moisture, green strength, compressive strength, permeability and deformation and to chart them to help to keep the sand in control. Mold hardness also is important. Sand holes account for 50 per cent of defects and are caused by many factors.

F. B. Rote, Albion Malleable Iron Co., Albion, Mich., discussed sand problems involved with the use of high-speed, automated molding equipment. Sand circulates in about 2 hours, and patterns vary greatly. Green compressive strength is 9 to 11 lb, clay about 7 per cent and moisture content 3.6 per cent. The sand must ram and mold well, hold together when lifted and have high flowability. Controls cover only moisture and mulling time. Because the sand moves fast, there is no time for tempering. A control unit measures moisture and temperature and makes additions accordingly. Control of variables beyond moisture and mulling its based on use of a slurry.

Participants in a gray iron session included, left to right, front row, C. C. Reynolds, W. C. Jeffrey, C. F. Walton and J. S. Vanick and, back row, left to right, Walter Edens, J. F. Wallace, Sidney Low and S. T. Walter

Speaking about defects caused by sand, G. F. Watson, American Brake Shoe Co., Mahwah, N. J., said that three deficiencies in sand can cause up of 75 per cent of scrap castings: 1. Sand reactivity (causes burnout). 2. Volumetric expansion (causes scabbing, buckling and similar defects). 3. Mold-metal reactions. The importance of each varies with different metals.

Reactivity Rises with Temperature

Reactivity is a more important problem as temperature increases, and mold-metal reactions increase as temperature falls. Drying CO_2-hardened molds gets rid of water and thereby cuts reactivity. Synthetic sand is less reactive than natural because it requires less water and does not contain as many impurities. Good grades of olivine sand are not reactive.

M. H. Horton, Deere & Co., Moline, Ill., discussed sand control in his company's ten foundries, each of which has its own control. Moisture is the most critical sand property. Good control involves several factors and has become increasingly difficult in the years since World War I.

Points to observe are to establish constant batch cycles, control moisture, maintain mullers, etc. Moisture at the speaker's foundry is controlled to ½ of 1 per cent—that is, over a range of 1 per cent. Determination of moisture is done automatically. A slurry system also is in operation.

J. B. Caine, consultant, Cincinnati, discussed sand in relation to steel castings. Many defects blamed on sand actually are caused by other factors.

Of sand properties, flowability is very important, but no adequate tests for it are available. Permeability also is vital. A measure of voids in sand, it is greatly variable and should be held to within 20 points, but often is not.

Permeability is related to the stiffness of the clay bond, in relation

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to which moisture is important. Clay and water mixtures easily can vary permeability 500 points. Moisture, green strength and permeability must be controlled very closely. Automatic controls should govern moisture, clay content and similar properties.

L. J. Pedicini, General Motors Corp., Detroit, who presided at the session, recommended separating system sand and spill sand to increase quality of preparation.

GRAY IRON SHOP COURSE

THE FIRST of two gray iron shop course sessions centered attention on **Basic Microstructure as Steps to Quality Castings.** Speaker was Lyle L. Clark, Armour Research Foundation, Chicago. In his presentation, he posed the question—"From the viewpoint of a foundry operator, what does structure mean in a casting?" The answer he sought to provide through numerous slides.

Assisting Mr. Clark in interpreting and explaining the slides was an impromptu panel consisting of W. W. Levi, chief metallurgist, Lynchburg Foundry Co., Radford, Va.; Harold W. Lownie Jr., assistant supervisor, Battelle Memorial Institute, Columbus, O.; and Ralph A. Clark, Detroit district manager, Electro Metallurgical Co., Division of Union Carbide Corp.

Subject for the second shop course was **Inoculation as a Step to Quality Castings,** with D. E. Krause, executive director, Gray Iron Research Institute, Columbus, O., as the speaker. Purpose of inoculating castings, it was pointed out, is to improve the quality, physical properties, machinability, etc., and to produce thinner sections.

Three groups of irons were considered by the speaker. First was that in which minor variations are made in analysis during melting; second was that in which inoculation is made to improve mechanical properties; and third was the so-called process irons. Inoculation requires a better supervision of melting, Mr. Krause observed. At the same time he warned there is some danger of pinholes resulting from inoculants.

LIGHT METALS

FOUR separate sessions and a roundtable luncheon featured the Light Metals Division program. Numerous subjects were covered in 16 formal papers, while the field of engineered light metal castings for automotive and appliance applications was discussed at the luncheon meeting.

The first session covered the status of technology for casting titanium, use of expendable graphite molds for titanium castings and the mechanical properties of two titanium alloys.

Status of Technology for Casting Titanium—G. H. Schippereit, R. M. Lang and J. G. Kura, Battelle Memorial Institute, Columbus, O., presented by Mr. Schippereit. Progress is being made in developing a process for casting titanium, and sufficient research has been done to indicate there is sound metallurgical basis for establishment of a titanium casting industry.

Research progress relating to melting furnaces, mold materials and alloys was reviewed and potential markets evaluated. The aircraft, guided missile and chemical process industries provide market potentials for titanium castings, and marine and ordnance applications are expected to provide a large portion of the military market. If a mature casting industry is developed by 1960, an estimated 3500 tons of titanium castings might be consumed.

Expendable Graphite Molds for Production of Titanium Castings—A. L. Feild Jr., E. I. DuPont de Nemours & Co., Wilmington, Del., and R. E. Edelman, Frankford Arsenal, Philadelphia, presented by Mr. Feild. It reports on an investigation to develop a mold composition based on graphite which would approach machined graphite in lack of reactivity and still be amenable to existing mold preparation procedures.

Mold material composition contains 53 per cent electric furnace graphite powder, 10 per cent dry cornstarch, 10 per cent pulverized pitch, 8 per cent carbonaceous cement, 1 per cent surface activating agent and 18 per cent water. (Later experiments have reduced water content percentage.)

Shaped unalloyed titanium castings can be cast successfully in this mold material, which is made by conventional foundry techniques. No internal porosity or surface pinholes are present in the castings from mold reaction. Chemical analysis of cast metal reveals it to be the same essentially as the original charged material. Mold preheat, increased metal superheat and mold material modification are to be investigated to see if a still better titanium casting can be produced.

Mechanical Properties of Cast Titanium-Iron and Titanium-Iron-Aluminum Alloys—N. Hehner, H. W. Antes and R. E. Edelman, Pitman-Dunn Laboratories, Frankford Arsenal, Philadelphia, presented by Mr. Hehner. This report describes the mechanical properties of two titanium-iron and titanium-iron-aluminum alloys after the addition of varying amounts of alloys, percentages ranging from 1 to 6 per cent and in varying combinations. Tensile strengths, yield strengths, elongation, impact properties and Brinell hardness numbers were recorded during the experiments and charted on slides. These slides were shown and the various properties discussed as related to the different alloys.

Second light metals session related to a low-impurity alloy, effect of chills and their practical application, tin and cadmium additions to a 4.5 per cent copper-aluminum alloy, and a new method of making small diameter cores for aluminum and magnesium castings.

Aging Practice for Aluminum Alloy HP 356—A. B. DeRoss, Kaiser Aluminum & Chemical Sales Inc., Chicago, pointed out that the new low-iron (0.15 max) 356 aluminum alloy (7 Si, 0.34 Mg) exhibits considerably higher ductility than the standard 356 alloy which permits use of other than the usual T-6 treatment to improve the strength properties.

The solution treatment at 1000°F and water quenching remains the same but by varying the aging temperature and the time at temperature a wide variety of mechanical properties may be obtained. In permanent mold casting properties may range

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from 41,000 psi tensile, 23,000 psi yield and 16 per cent elongation to 45,000 psi tensile, 34,000 psi yield, and 8 per cent elongation. In sand casting it may range from 37,000 psi tensile, 25,000 psi yield and 10 per cent elongation to 41,000 psi tensile, 34,000 psi yield and 5 per cent elongation. Suggested aging cycles for permanent mold work are 2 or 8 hr at 320°F while for sand cast work they are 2 hr at 350°F or 2 to 4 hr at 400°F.

Performance of Chills on High-Strength, High-Ductility Sand-Mold Castings of Various Section Thicknesses—M. C. Flemings, P. J. Norton and H. F. Taylor, Massachusetts Institute of Technology, Cambridge, Mass., showed that end chills applied to cast plates of 195 and 356 aluminum alloys markedly improved the properties of the entire plate sections. The improvement at distances away from the chill was greater for thicker plates.

The investigation indicated that careful chilling of production castings would result in a 70 per cent increase in tensile strength, 40 per cent increase in yield strength, and a sevenfold increase in ductility.

A companion paper, **Rigging Design for a Typical High-Strength, High-Ductility Alloy Aluminum Casting** by the same authors described the practical application of the data previously obtained on chilling. Casting chosen was a high-quality aircraft housing about 14½ x 15 x 9 in. with wall thickness varying from ⅜ to 1⅞ in., and weighing 22 lb. Casting was chilled heavily with chills about 4 in. apart. Risers were located between the chills.

Test specimens taken from various sections of castings made with and without chills showed a sharp difference in properties. In the 195 alloy the unchilled casting's average properties were 36,900 psi tensile, 25,200 psi yield, and 4.3 per cent elongation. Chilled casting showed average properties of 46,900 psi tensile, 28,400 psi yield and 10 per cent elongation. Chilling increased average properties of the 356 alloy casting from 31,000 psi tensile, 26,400 psi yield and 1.4 per cent elongation to 42,300 psi tensile, 32,700 psi yield and 5.8 per cent elongation.

Effect of Small Tin and Cadmium Additions to Binary Aluminum-Rich Copper Alloys—H. V. Sulinsky, R. C. Harris and S. Lipson, Pitman-Dunn Laboratories, Frankford Arsenal, Philadelphia. Additions of 0.03 to 0.05 and 0.05 to 0.10 per cent, respectively, of tin and cadmium were made to the 195 (Al-4.5 Cu) alloy. These elements increase the yield and tensile strengths but reduce ductility considerably. Retention of a reasonable amount of ductility can be obtained by reducing the copper content of the alloy to around 3 per cent, resulting in properties of 46,000 psi tensile, 40,000 psi yield and 3 per cent elongation for both tin and cadmium alloyed material. Titanium addition as a grain refiner gave some improvement in elongation of tin containing alloys, but was detrimental to properties of cadmium-containing alloys.

Intricate Small Diameter Coring for Aluminum and Magnesium Castings by R. F. Dalton, Howard Foundry Co., Chicago. Procedure developed by the firm is use of soft copper tubing covered with woven glass fiber sleeves in the case of aluminum-base alloys and with braided stainless steel sleeves for magnesium-base alloys. The sleeves prevent solution of the tube by molten metal, minimize blows and serve as proof of pipe removal. Removal of copper pipe is accomplished in the case of aluminum-base castings by use of 70 per cent nitric acid. With magnesium-base castings a mixture of one-half 70 per cent nitric acid and one-half 70 per cent hydrofluoric acid is employed; the hydrofluoric acid inhibits action of nitric acid on magnesium. After the copper tubing is dissolved, the braided sleeves are pulled from the castings.

View of participants in the first of four light metals technical sessions

An overflow crowd attended the roundtable luncheon session and heard an interesting discussion on the uses of light metal castings, mainly permanent mold or die castings, in the automotive and domestic appliance industries. Informal talks were presented by Fred Mason, Chrysler Corp., Detroit and C. M. Curtis, Maytag Co., Newton, Iowa.

Walter Sicha, Aluminum Co. of America, Cleveland, reported briefly on some of the work being done on various research projects under sponsorship of the AFS. Nature of the work was not of general interest to the conference and no formal papers were scheduled. The progress reports will appear in AFS *Transactions*.

Much To Be Done with Light Metals

Mr. Mason indicated that there is still much to be done with light metals in the automotive industry. Permanent molders must effect automation and closer controls if they are to grab a larger share of the automotive market. Die casters must improve metal handling techniques at the machine and should move in the direction of smaller machines with lower pressures so that over-all costs can be reduced. The automotive industry is looking for the best casting at the minimum price. There appears to be a great future ahead for light metals if present obsolete production methods are improved upon and dimensionally accurate, cored castings can be supplied. Some future uses will be in engine blocks, brake housings, decorative trim, rear end differential housings, transmission housings and wheels.

Mr. Curtis said that today's trend in domestic appliances to design for obsolescence, and the need for frequent model changes in washers, dryers and other appliances, leads light metals to favorable acceptance by the design engineer. Light metals satisfy customer demand for eye appeal as they can be plated and polished. They provide the stylist with unlimited opportunity. An adequate metal supply and relatively stable prices appeal to the manufacturer. The casting operation, either permanent mold or die casting, lends itself to automation (especially if part of a captive operation) and can be incorporated directly into production lines, with resultant cost savings.

At the third session, two papers were presented on die casting alloys and one each on vacuum die casting and automatic metering of magnesium for cold chamber die casting.

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The steel technical program was opened by a session in which these foundrymen participated. Left to right are A. J. Kiesler, Victor E. Zang, Dale L. Hall, C. J. Zilch, J. J. Chyle, A. E. Gross and R. D. Engquist

Die Casting Alloys—G. W. Stickley and J. L. Miller, Aluminum Co. of America, Pittsburgh, Pa., presented by Mr. Stickley. This report gives results of reversed bending and axial-stress fatigue tests of 218 and 380 aluminum die casting alloys at room temperature, and of reversed bending tests at temperatures up to 500°F.

Corrosion of Aluminum Die Castings—By D. L. Colwell and R. J. Kissling, Apex Smelting Co., Cleveland, presented by Mr. Colwell. Accelerated corrosion tests were conducted on several aluminum die casting alloys—39, 39-11, 2393, 13, 2312, 36 and 43. Tensile strength, yield strength, elongation and Charpy impact strength were determined and the test bar weight loss measured.

Best resistance to corrosion of regular die casting alloys was found in straight silicon alloys 43 and 13. No. 43 has superior ductility but low yield strength. The higher silicon content of 39-11 compared with 39 does not improve corrosion resistance, even though the higher silicon content is desirable for castability.

Vacuum Die Casting Today and Tomorrow—David Morgenstern, Nelmor Mfg. Co., Euclid, O. Development of a successful technique for vacuum die casting on a commercial production basis has improved physical properties of the castings, decreased wall stock so that the savings in weight and cost of production make die castings competitive with stampings. The new technique opens new fields for the designer as well. Another development is the successful application of anodizing to aluminum die castings that are vacuum cast.

A complete hood is built around the platen. The hood is in two sections, one surrounding the fixed platen, the other surrounding the movable platen. Enough telescoping action is built into the hood to allow for variation of die heights. The mating surfaces of the hood are sealed while the die faces are some distance apart. The system is evacuated at this point by an accumulator storage tank. The die continues to close and is fed metal in a completely evacuated system.

The entire process is synchronized automatically with timers and limit switches. Commercially optimum results are obtained at a vacuum level of 15-18 in. of mercury. The increment of improvement below 18 in. drops off rapidly and has not been found worthwhile. As entrapped air is eliminated from the casting, a shorter cooling period is required and cycle speeds have been increased as much as 25 per cent.

Automatic Metering of Magnesium for Cold Chamber Die Casting—F. L. Burkett and F. C. Bennett, Dow Chemical Co., Midland, Mich., presented by Mr. Burkett. An automatic metering mechanism has been perfected for supplying molten magnesium to cold chamber die casting machines. Casting rates have been increased to the limit of the cooling capacity of the dies; controlled metal transfer conditions assure part quality; operator movements have been reduced and shot sizes increased over conventional hand ladling operations. Ease of installation permits flexible operations for casting different metals on the same machine. Simple design, minimum start up time, trouble-free performance and low maintenance are reported features of the mechanism.

In operation, molten magnesium alloy is charged to the gas or electrically heated steel holding pot. Metal is protected from oxidation by a conventional flux or a sulphur dioxide atmosphere. Magnesium from within the pot flows by gravity through a heated transfer pipe leading to a valve above the shot well on the machine. Magnesium seeks the same head in the valve standpipe as is maintained in the holding pot. The free surface of metal in the standpipe and the atmosphere adjacent to the valve outlet are purged with sulphur dioxide to inhibit any oxidation.

Valve and transfer pipe are maintained at a controlled temperature. Discharge of metal for each cast is controlled by electrical sequence wired into the machine circuit. When the operator presses the die-close button, the machine closes the die, and the automatic feed is energized

Two fundamental papers sessions were presented during the Congress. Left to right at the first one are C. C. Ackerlind, J. E. Niesse, D. V. Ragone, S. Floreen, M. C. Flemings, J. F. Wallace, W. D. Walther and H. Rosenthal

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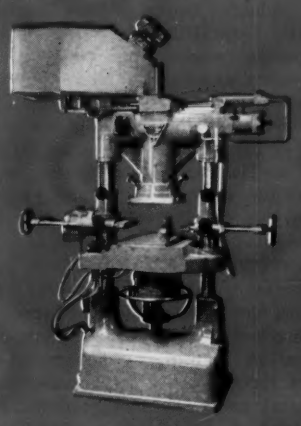

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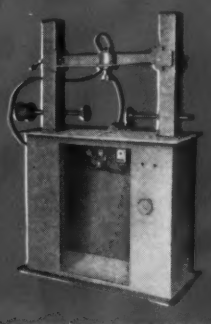

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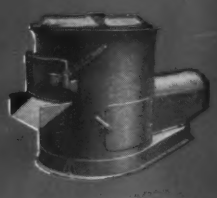

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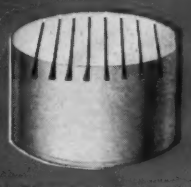

Self-Cleaning, Taper-Slot
CORE VENTS

Left to right, checking data at a statistical methods session, are W. K. Bock, R. L. Yard, J. J. Henry, E. C. Zuppann, A. M. Schneider and J. Hromi

to raise the metal valve stem for a timed interval to release a constant weight of metal. The machine shot plunger injects the metal into the die cavity and, following the die holding time, the machine opens and ejects the casting. The cycle then is complete.

Concluding session on light metals included four papers. **Effect of Nitrogen and Vacuum Degassing on Properties of a Cast Aluminum-Silicon-Magnesium Alloy (Type 356)**—R. K. Owens, H. W. Antes and R. E. Edelman, Frankford Arsenal, Philadelphia. This report, presented by Mr. Antes, compared the relative efficiencies of vacuum and nitrogen in degassing operations and determined the effect of gas content on the tensile properties of the alloy.

A degassing time of 10 to 15 minutes is necessary to provide gas-free metal with either process, but no difference was found in the tensile properties of vacuum or nitrogen degassed 356 alloy for a given degree of soundness. Hydrogen has a moderately detrimental effect on tensile properties of cast alloy virgin metal in the range of 0 to 1 per cent voids and an extremely detrimental effect on properties of 356 alloy remelted metal. The greatest decrease in properties is caused by the first 1 per cent voids.

Controlled Gas Content in Foundry Work—E. Scheuer, International Alloys Ltd., Aylesbury, Bucks., England. Presented by D. L. Colwell, Apex Smelting Co., Cleveland. This report described a process for bubbling hydrogen through molten metal to provide a test method which duplicates surface shrinkage defects.

Effect of Various Factors on Mechanical Properties of Magnesium Casting Test Bars—J. W. Meier and A. Couture, Dept. of Mines and Technical Surveys, Ottawa, Ont., Canada. Presented by Mr. Meier. Machining was found to have little effect on tensile strength of cast to size bars. Study of pouring temperature influence on separately cast bars revealed relatively small change in properties. Variations in cut-out bar properties were the same for both flat and round sections.

Hot Tearing of Magnesium Casting Alloys—R. A. Dodd, W. A. Pollard and J. W. Meier, Dept. of Mines and Technical Surveys. Presented by Mr. Dodd. Binary Mg-Al and Mg-Zn alloys are not as susceptible to tearing as constitutionally similar alloys. The relationship between tearing and constitution, however, is similar to that known to exist in the case of many binary aluminum alloys of simple eutectiferous form.

With the exception of the Mg-3 per cent Al-1 per cent Zn composition, industrial alloys in the Mg-Al-Zn system are comparatively free from hot-shortness, while alloys containing rare earths are only slightly inferior to the Mg-Al-Zn class. Most other compositions are hot-short to some extent, the Mg-Zn-Zr and Mg-Zn-Th-Zr alloys being the most prone.

Presence of appreciable quantities of eutectic is associated with comparative freedom from hot-shortness, while an explanation of the hot-shortness of susceptible compositions is given in terms of liquid grain boundary film existing at slightly supra-solidus temperatures.

Left to right at a pattern session which began an all-day program for pattern-makers are David T. Kindt, J. B. Templeman, J. M. Kreiner and H. A. Burton

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Designed to provide engineers and others with a ready reference to the properties and characteristics of metals, the book is comprised largely of engineering tables containing information helpful to designers of gears, threaded devices and other mechanical parts. It was prepared by a group of volunteers working under the auspices of the Council of the ASME.

How to upgrade your iron without changing furnace practice

Small additions of molybdenum, made right in the ladle, are the most practical way to add strength and toughness to gray cast iron. A good rule of thumb to follow is: 50 points of moly=7000 psi tensile strength.

There's no need to interfere with your regular cupola operation when a job calls for high strength iron. Simple-to-make moly additions in the ladle provide needed strength, without any sacrifice in toughness. In fact, moly increases toughness at least as much as strength.

Moly helps, too, in obtaining uniform response to heat treatment, and in producing machinable, growth-resistant castings.

Remember: Moly additions upgrade your iron – with no change in the character of the charge, normal melting practice, or the base metal. For more information on why moly makes better cast iron, write for the series of bulletins "Why Moly Iron". Climax Molybdenum Co., Dept. 20, 500 Fifth Avenue, New York 36, N. Y.

MOLY MEANS STRENGTH

0.25% Mo will increase tensile strength by about 3500 to 4000 psi
0.50% Mo will increase tensile strength by about 7000 to 7500 psi
0.75% Mo will increase tensile strength by about 10500 to 11000 psi
1.00% Mo will increase tensile strength by about 14000 to 15000 psi

Section size 1.2 in. dia.

CLIMAX MOLYBDENUM

Circle 665 on Inquiry Card—Page 51

Around the Country

NEWS REPORTS FROM

Chicago . . . Pittsburgh . . . Philadelphia . . . Detroit

Pittsburgh— Foundries began to close for vacations in late June. By the first week in July, most foundries in this area will be idle. The customary shutdowns may extend a little longer this year than usual. Some firms will be closed for a month to make necessary repairs.

Foundries supplying a few industries will be too busy to allow much relaxation this summer. The mill equipment group has been able to whittle down its unfilled order backlog only slightly this year. Backlogs now average about 12 months. Equipment makers say there has been a decline in new orders in the past month, caused by drops in the steel operating rate. If that rate rises again in late third quarter, equipment producers predict a halt in the present new order decline.

Companies producing steel mill rolls and railroad car wheels are strong consumers of merchant pig iron, say suppliers of that commodity. Aside from the traditional summer vacation slowdown, pig iron shipments suffer from lack of activity in foundries supplying agricultural, plumbing and heating industries. Suppliers to agricultural and automotive industries look for an upturn in sales during September or October.

Detroit— Much already has been published about the Edsel which is to be offered to the public next September. The tempo of publicity material, however, will be stepped up in the next few weeks as the time approaches for the car to make its try at getting a bigger share of the medium priced auto market for Ford Motor Co.

Richard E. Krafve, a Ford vice president and general manager of the Edsel Division, predicts that normal yearly automobile sales will be 8,500,000 units by 1965 with peak years of 10 million cars. That's a sizable growth from the 5,900,000 cars sold in 1956. The prediction is based on expected population expansion and the growing income of middle class families.

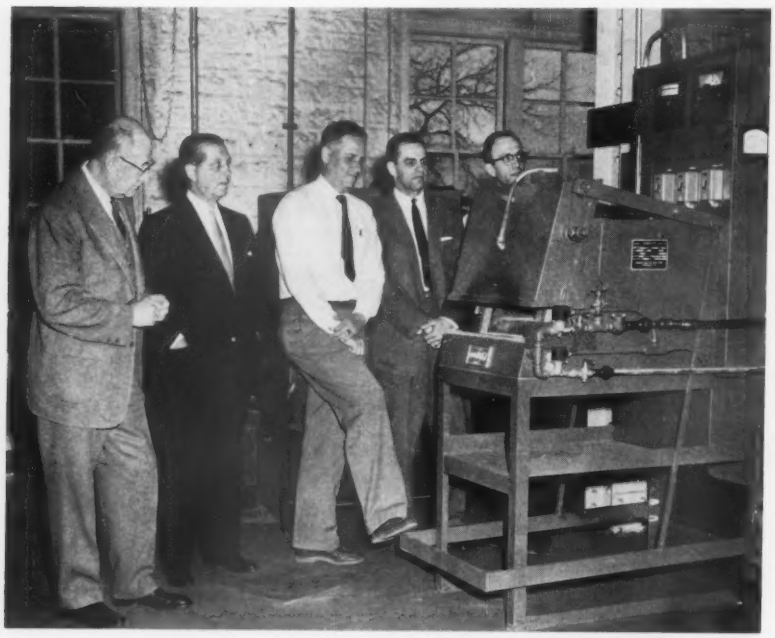
As their income increases those families buy more expensive cars. That is why medium priced cars account for 60 per cent of today's market. And that growing market is the one for which the Edsel was developed. Its four series—Ranger, Pacer, Corsair and Citation—will cover the field from the luxury models of the low-priced lines to the top level models of the medium-priced lines.

The new car also creates foundry business. In addition to the company's own gray iron and aluminum die casting foundries, 34 outside shops will furnish castings. Ten will produce gray iron parts, four malleable iron, 15 aluminum die castings, seven aluminum permanent mold castings and two zinc die castings. There are four duplications; a division of one of the malleable shops will make gray iron castings, one of the aluminum die casting shops also will make permanent mold parts and two aluminum diecasters also will produce the zinc castings.

Gas turbines get into the news again with announcement by General Motors Corp. engineers that turbines are practical and feasible for heavy duty and military vehicles with no additional engineering breakthroughs required to put heavy turbine vehicles on the road. What is needed is additional work in development and manufacturing.

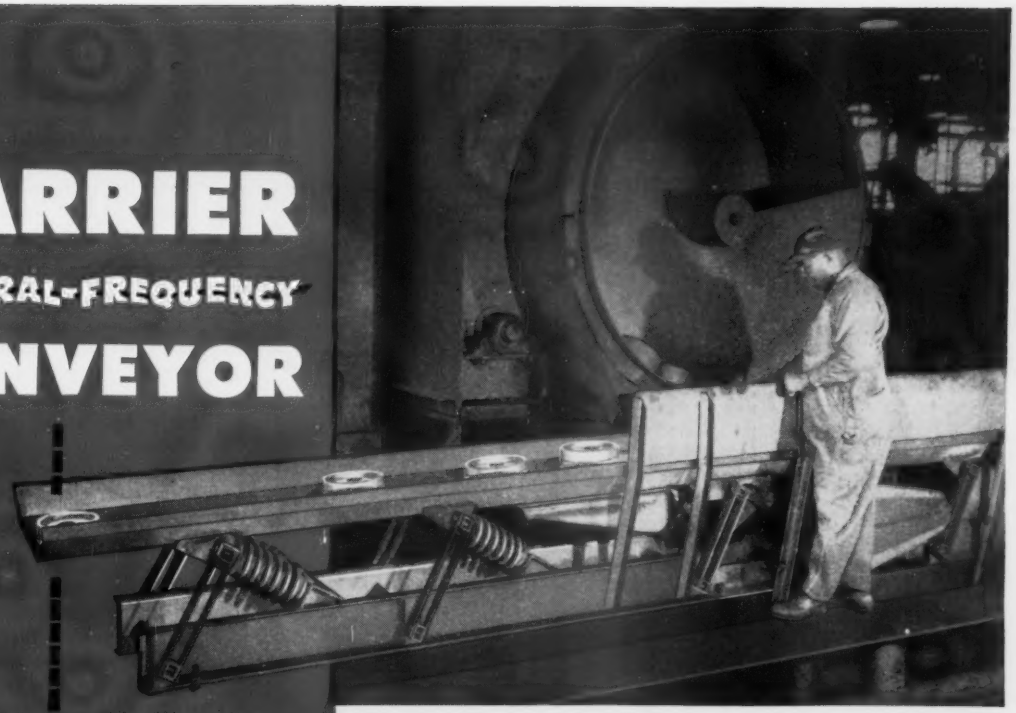
The experimental Chevrolet Turbo-Titan, a heavy duty truck-tractor, under normal rating of 50,000 lb gross combined weight has an acceleration (zero to 40 mph) improvement of 27.5 per cent over a standard piston truck engine. The turbine showed a 17 per cent improvement in climbing grades.

According to tests by the GM en-

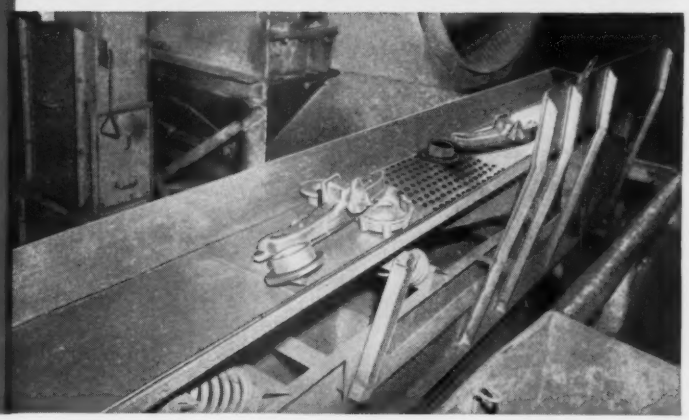


REMODELS FOUNDRY LAB: Officials of Washington University, St. Louis, show a new controlled atmosphere furnace in the remodeled foundry practice and alloy development laboratory to C. Powell Whitehead, president, General Steel Castings Corp., Granite City, Ill., whose firm donated $15,000 for new equipment. Left to right are Ethan A. H. Shepley, chancellor of the university; Mr. Whitehead; Leonard Gulbransen, associate professor of metallurgy; Hadley Grimm, director of industrial liaison; and John N. Ong Jr., assistant professor of mechanical engineering. Other new equipment includes an induction melting furnace, a tensile tester and an x-ray diffraction unit

CARRIER
NATURAL-FREQUENCY
CONVEYOR



TAKES HEAT, IMPACT AND ABRASION IN STRIDE!



HERE you see a 15′ Carrier Natural-Frequency Conveyor at work underneath a Pangborn Rotoblast "Continuous-Flo" Barrel in International Harvester's Indianapolis plant. It puts in a rugged 16-hour day conveying 320 tons of hot gray-iron castings, including heavy water-pump housings, flywheels, retaining rings and other engine parts.

Foundry applications are only one of the many uses for Carrier Conveyors. Others include bulk chemicals, cement, ores, mill scale and slag, food products and machine turnings — all of which are now being successfully conveyed and processed by Carrier Natural-Frequency Vibrating Equipment. Write for Bulletin 112. Carrier Conveyor Corporation, 253 North Jackson Street, Louisville 2, Kentucky.

CARRIER CONVEYOR ABOVE HAS FOUR BIG ADVANTAGES OVER PREVIOUS METHOD:

1 Vibration of unit accomplishes far better job of shot removal.

2 Instead of bunching up, castings now move quickly and evenly down conveyor, for easier sorting.

3 Heavy steel-plate trough resists impact, heat and abrasion, making maintenance costs negligible compared to a belt.

4 Patented Carrier Natural-Frequency drive uses heavy coil springs as drive units. Result — low input horsepower, uniformly distributed operating stresses, and a *minimum of mechanical maintenance.*

CARRIER CONVEYOR CORPORATION, LOUISVILLE 2, KENTUCKY

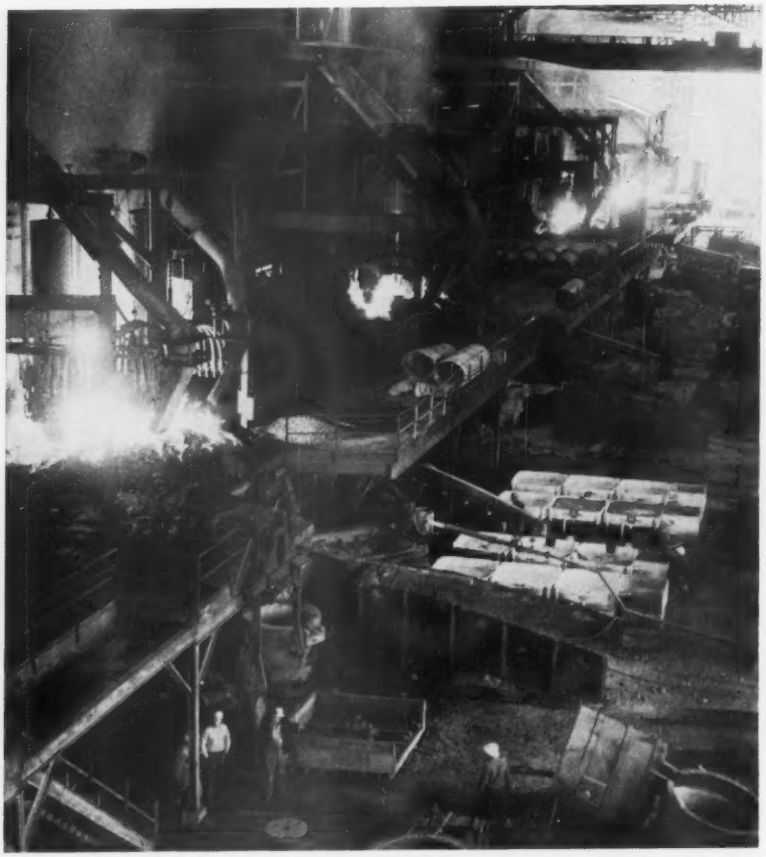
gineers, current miles-per-gallon economy of a piston engine is slightly better than that of a turbine, but fuel cost for the turbine is the same or less than that of piston engines. More important, however, is that a truck powered with a turbine of comparable power to a piston engine will handle additional payload.

The board of directors of the Automobile Manufacturers Association on June 6 unanimously recommended to member companies that they take no part either directly or indirectly in automobile racing or other competitive events involving tests of speed and that they refrain from suggesting speed in passenger car advertising or publicity. Furthermore it recommended that specific engine size, torque, horsepower or ability to accelerate or perform not be advertised or publicized in any context that suggests speed.

The board believes that automobile manufacturers should encourage owners and drivers to evaluate passenger cars in terms of useful power and ability to afford safe, reliable and comfortable transportation.

All volume producers of passenger automobiles in the U. S. are represented in the association.

NEW PLANT BOOSTS FERROALLOY CAPACITY



CAPACITY for production of ferroalloys has been increased substantially by Tennessee Products & Chemical Corp. with the virtual completion of its new plant at Rockwood, Tenn. The company, a Merritt-Chapman & Scott Corp. subsidiary, held a formal opening of the facility on May 22. At that time most of the plant's 12 electric furnaces were operating.

The plant, which has an annual capacity of about 200,000 tons, includes two units. No. 1, a portion of which is shown above, houses eight submerged-arc furnaces. No. 2 plant houses four open-arc furnaces. Equipped to make a wide variety of ferroalloys, the plant's principal products will be ferrochrome, ferrosilicon and ferromanganese. Power requirements are 122,000 kw continuous load. Before building the new plant, the company's ferroalloy operations were confined to two electric furnace plants in Chattanooga and to its Tenn-Tex Alloy & Chemical Corp., which has three electric furnaces at Houston, Tex.

Tennessee Products also produces pig iron from two blast furnaces at Rockwood. Among other properties it operates by-product coke ovens at Chattanooga, and foundries for production of soil pipe and fittings at Rockwood and Chattanooga.

Chicago— This city now has a new zoning code with far-reaching implications to industry. Late in May the city council unanimously passed comprehensive amendments to the old code prepared over seven years ago at an estimated cost of $750,000.

The steel and paint industries, in particular, warned that if the amendments were adopted as drafted, they would find future expansion in Chicago impossible. It was pointed out that standards for compliance were too strict and unrealistic. City council had planned fast adoption of the amendments but deferred action in the face of the criticism. Mayor Richard Daley promptly appointed an industry committee to work with the council zoning committee to develope acceptable recommendations.

Through this means most of the objections were discussed and adjusted and now industry believes it can live with the new code.

A number of Chicago suburbs are considering modernizing of their zoning codes and it appears likely that the new Chicago code will set the pattern.

Late in May, the Foundry Division of Hansell-Elcock Co., Chicago, made successful use of a three-day open house to show its customers and prospective customers how it uses quality controlled operations to make structure controlled gray iron castings. This foundry, which makes castings ranging in weight from 40 pounds to 20 tons, has been serving industry since 1888.

Open house visitors, numbering 250 and representing 100 companies, were served lunch and conducted on plant tours which included stops in every department.

The average foundryman probably believes that price is the dominant factor in the sale of castings. This is not so, according to Richard C. Meloy, marketing director, Gray Iron Founders' Society, Cleveland. Addressing the organization's midwestern regional marketing seminar in Chicago, May 28, he cited figures obtained in a survey which revealed that 66 per cent of customers consider quality the most important factor. Only 18 per cent regard price

SHELL MOLDERS:
Speed Shell Production with
DOW CORNING 8 EMULSION
(SILICONE PARTING AGENT)

You'll say it's "sheer magic" when you see the way Dow Corning 8 Emulsion helps increase production of dimensionally accurate sand-resin shells and shell cores.

The silicones in Dow Corning 8 are so remarkably heat resistant, they refuse to decompose at molding temperatures. With only a minimum of build-up, molds stay clean much longer . . . You spend more time **producing** good shells, less time cleaning patterns.

Let Dow Corning Silicones lend a hand in getting longer production runs from your patterns. Use Dow Corning 8 silicone emulsion for easy release, less build-up and lower costs.

8 reasons why . . .

LEADING SHELL MOLDERS PREFER DOW CORNING 8 EMULSION water-dilutable silicone parting agent . . .

• quick, easy release • easy to apply — faster wetting action • economical in extremely low concentrations • resists creaming or separation • minimum build-up — closer tolerance shells • stepped-up production — maximum number of shells between pattern cleanings • nonflammable • fast delivery from centrally located warehouses.

Generous Free Sample and new "how to do it" brochure on Shell Molding with Silicones are yours for the asking. Address Dept. 5919

first in silicones

Dow Corning CORPORATION

MIDLAND, MICHIGAN

ATLANTA BOSTON CHICAGO CLEVELAND DALLAS DETROIT LOS ANGELES NEW YORK WASHINGTON, D C

SAVE

WITH *Acme*

MELTING POTS
INGOT MOLDS

Designed by
FOUNDRYMEN...
for FOUNDRYMEN

You'll find it pays to standardize on Acme melting pots and ingot molds. They reduce down time and replacement costs because they're cast from a special iron formula that combines strength with high temperature resistance. They improve quality and reduce rejects, too, because they're designed for even heat distribution without hot spots. If you melt any non-ferrous metals, take advantage of our more than 30 years' experience in this field. It's your assurance of consistent high quality in Acme melting pots and ingot molds . . . designed *by* foundrymen, *for* foundrymen.

Quick delivery anywhere in the United States.
Write for size list showing 40 standard sizes.

Acme FOUNDRY CO.

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as the major consideration. About 15 per cent place delivery first.

The one-day Chicago conference, seventh in a series of nine over the country, was attended by about 70 society members. Walden G. Greenlee, president, Greenlee Foundries Co., and chairman of the society's Chicago Management Group, presided. Chief participants in the program were Mr. Meloy and E. Harold Mitchell, society field director.

Philadelphia— With vacation season at hand, foundry operations should hit a new low for the year. Many foundries will be down for one to two weeks for mass vacations in the early part of July (more will be down for two weeks than heretofore).

June production declined somewhat from May. Some shops report more of a leveling off, but declines at others brought the general average down.

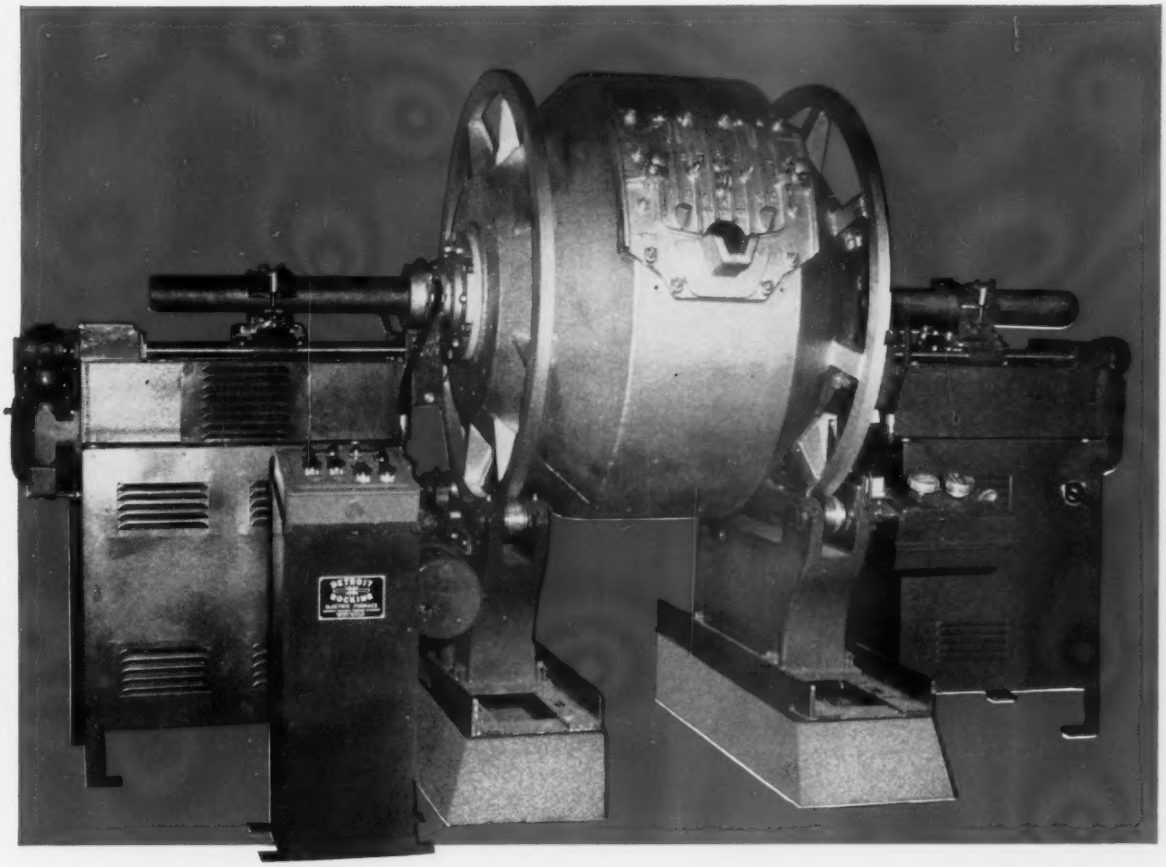
Gray iron job foundries have been averaging less than four days a week with backlogs around two weeks. Business is fair for construction equipment, material handling machinery and paper making machinery. Demand for machine tool and textile equipment castings is very slow.

Pattern work is spotty. Pattern makers are enjoying fair business for heavy electrical equipment and ship work, but in most other lines there is a lag. In the northern New Jersey area pattern shops are scratching for business.

Steel casting shops continue in better position than other foundries. Most are working five days a week and average five to six weeks on backlogs. Specifications for ship propulsion machinery and heavy industrial and electrical equipment remain active. Recent award of a $119,000,000 contract for combat tanks to the Newark, Del., plant of the Chrysler Corp., is expected to result in substantial casting awards later, but it is too early to say precisely when. Malleable shops are operating moderately well. The hardware lines are somewhat more active, and there is a fairly good demand for small precision castings.

Business among the brass and bronze job shops is spotty. These foundries are operating at less than four days a week, have practically nothing in the way of backlogs, and are even running into competition from some captive shops.

Demand for industrial valves and fittings has sloughed off moderately, but shipyard foundries are busy.



Get Greater Melting Efficiency With Detroit ROCKING Electric Furnaces

NEW ARC CONTROL SYSTEM AND MOTORIZED ELECTRODES ASSURE MAXIMUM HEAT UTILIZATION, AUTOMATIC ELECTRODE POSITIONING

The new "P" Series Detroit Rocking Electric Furnaces feature a simplified arc control system combined with motor-driven, pedestal-mounted electrodes.

The indirect arc is automatically controlled by a magnetic amplifier which adjusts motor speed in direct proportion to arc unbalance. This instantaneous action provides maximum heat per power input. There are no moving parts, relays or contactors to break or wear out.

Standard graphite electrodes are independently mounted on pedestals and motor driven. A ⅛ h.p. D.C. motor drives the automatic control. Direct-connected ⅓ h.p. A.C. motors on each electrode permit manual push-button control at greater speeds than possible by hand. This speeds electrode positioning for charging and shell change.

For full details on the new "P" Series indirect arc Detroit Furnaces, write for Bulletin 5610.

Ratings for furnaces with pedestal-mounted electrodes, motor controlled

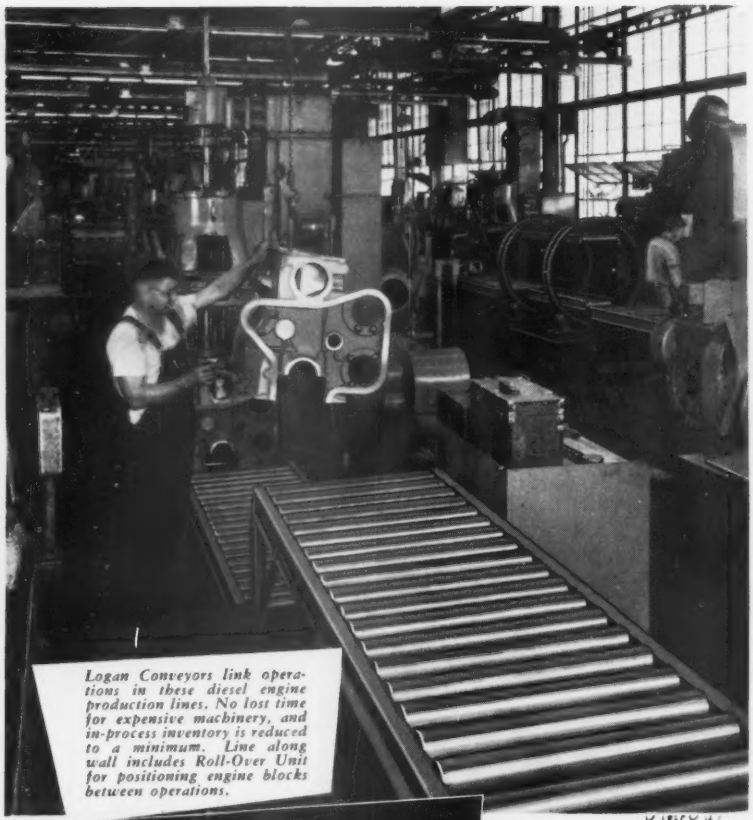
Furnace Type	KW Rating	Nominal Cold Charge	Minimum Molten Metal
LFCP	125	350	500
LFNP	150	500	750
LFYP	175	700	1250
AAP	250	1500	3000
AAP	400	1500	3000
CMP	400	4000	8000
CMP	600	4000	8000

DETROIT ROCKING ELECTRIC FURNACES

Detroit Electric Furnace Division, Kuhlman Electric Company • Bay City, Michigan

MEMBER FEMA

Foreign Representatives: in BRAZIL—Equipamentos Industrias, "Eisa" Ltd., Sao Paulo; CHILE, ARGENTINA, PERU and VENEZUELA: M. Castellvi Inc., 150 Broadway, New York 7, N.Y.; MEXICO: Cia Proveedora de Industrias, Atenas 32-13, Apartado 27A3, Mexico 6, D.F., Mexico; EUROPE, ENGLAND: Birlec, Ltd., Birmingham.

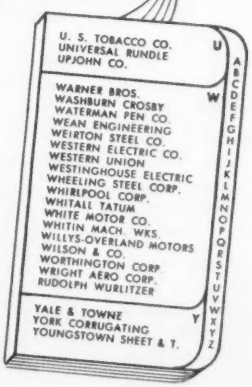


Logan Conveyors link operations in these diesel engine production lines. No lost time for expensive machinery, and in-process inventory is reduced to a minimum. Line along wall includes Roll-Over Unit for positioning engine blocks between operations.

The LEADERS use Logan

The mark of a leader is—"ability to deliver the goods." In more ways than one, Logan Conveyors aid the nation's leading industries to do just that. Logan equipment makes important intra-plant deliveries, linking up all production operations into one efficient whole. And these conveyors, built to convenient working heights, save bending, lifting and straining, too. Remember you get value-plus, that something-added when you specify Logan-engineered conveying equipment. Write today to—

LOGAN CO., 580 CABEL ST., LOUISVILLE 6, KENTUCKY



Logan Conveyors

Obituary

FRED W. BUSCHE, 64, president, Falls Foundry Co., Menomonee Falls, Wis., and General Foundries Co., Milwaukee, died May 26, as the result of an injury at Falls Foundry Co. Earlier connections included Prime Mfg. Co., Milwaukee, and Iroquois Foundry, Racine, Wis.

Harold H. Johnson, 63, president, Los Angeles By-Products Co., and director, Los Angeles Steel Casting Co., Los Angeles, died May 4. He went to Los Angeles in 1924 after graduation from Marquette University. During World War II Mr. Johnson was a metal consultant for the War Production Board.

Fred H. Lindahl, 71, former president, Henry L. Lindahl Machine & Foundry Co., Cicero, Ill., died May 10. Mr. Lindahl retired in 1943 from the company which his father had founded.

Stanley B. Wentz, 66, president, Pennsylvania Foundry Supply & Sand Co., and treasurer, Pennsylvania Chaplet Co., Philadelphia, died May 29. Mr. Wentz was one of the founders of both companies.

Lewis N. Murray, 84, president, Dunkirk Radiator Corp., Dunkirk, N. Y., and board chairman, Utica Radiator Corp., Utica, N. Y., died Apr. 28.

George J. Ehrhardt, chief engineer, Clamshell Bucket Department, Blaw-Knox Co., Pittsburgh, and one of the pioneers in the design of the modern clamshell bucket, died June 4.

Book Review

National Standards in a Modern Economy, edited by Dickson Reck, cloth, 372 pages, published by Harper & Brothers, New York. Available from American Standards Association, 70 East 45th St., New York, N. Y. Price $5.

Thirty-four leaders in private and industrial organizations review the evolution of industrial standards and their crucial place in the world of today.

These authorities link such standards with the achievements of scientific research and technological innovation that bring about high production efficiency in the age of automation. The vital role of standards in interchangeable parts manufacture, international relations, quality control, management and research and development are discussed.

"... the only trouble-free piece of equipment we've ever owned"

Model B-7½-AC Tabor-Brasive Cut-Off Machine, in ten years of maintenance-free service at Terminal Brass and Aluminum Foundry, South San Francisco, California. Strictly a jobbing foundry, Terminal cuts both aluminum and brass, large and small items, in volume or on small orders.

"Our Tabor-Brasive Cut-Off Machine is the *only trouble-free piece of equipment we've ever owned,*" writes W. M. Jensen, Jr., of Terminal Brass and Aluminum Foundry, South San Francisco. "We bought it new in 1947, and it's been in steady use for more than 15,000 hours. Absolutely the only attention it ever needed was two V-belt changes!"

The newest Tabor-Brasive Cut-Off Machines bring even greater benefits to the production foundry. On the redesigned 5 hp machine, there's increased table room and a full range of cutting service. The 15 hp machine, with its new hydraulic table lift, gives less operator fatigue and faster cuts. Cuts any metal. Brass, aluminum, iron or steel — they're all the same to a Tabor Machine.

If mechanization will meet your problems, the man to see is the Tabor Man. Call him — or write for detailed data.

TABOR

THE TABOR MANUFACTURING CO.
Division of Turbo Machine Company
LANSDALE, PA.

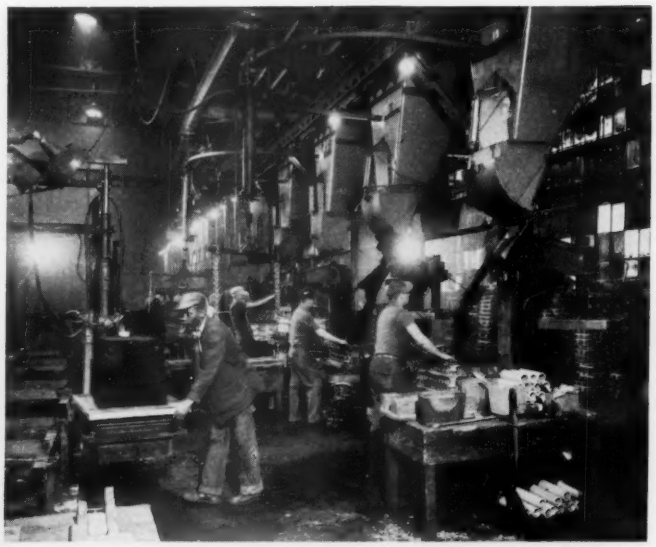
FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

Circle 671 on Inquiry Card—Page 51

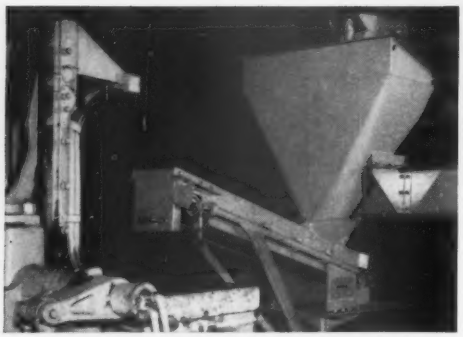
Your Sand System
is as Good
as Its Weakest Part

. . . That's why successful foundries invest in NEWAYGO ENGINEERED SAND SYSTEMS and COMPONENTS. Newaygo equipment is "foundry designed" to give continuous performance day after day, month after month, under toughest foundry production conditions.

All NEWAYGO ENGINEERED EQUIPMENT, whether it is a complete system or a component part stresses rugged construction — minimum handling and maximum production.



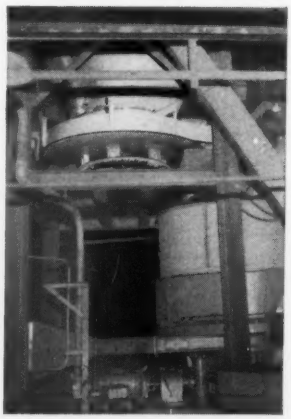
Molding Hoppers and Gates, a typical Newaygo engineered installation showing a bank of 19 overhead molders' hoppers serving cope and drag floors and squeezer molders. Emphasis is on maximum mold preparation with minimum fatigue.



Pivoting Flask Filler, a high speed, high capacity belt-type feeder Newaygo designed to receive sand from storage hoppers, plate feeders, belt conveyors or elevators. Spreads sand uniformly in large flasks on rollover machines or for floor molding.

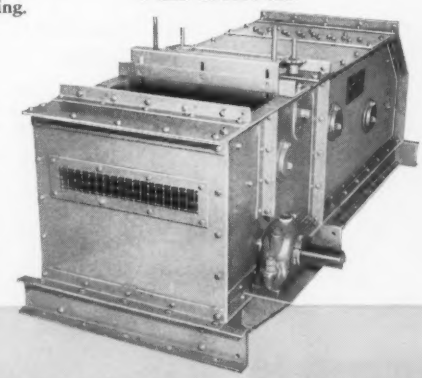
Rotary Plate Feeder

Positive volume feeder supplying a steady controlled flow of sand from 0 to over 100 tons per hour. Newaygo engineered to prevent spillage, sticking or bridging. Standard sizes 3, 6, 8 and 10-foot dia.



Aerator

A patented Newaygo design, this high speed aerator blends, tempers, cools and aerates sand more thoroughly than is possible by any other method.



Full information and specifications on all Newaygo Foundry Equipment are contained in Bulletin No. 56. Send for your free copy.

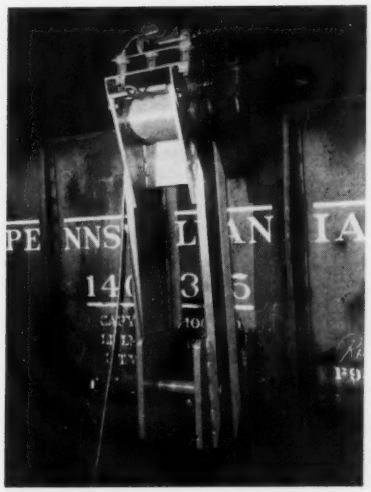
"Foundry Business is BIG Business"

NEWAYGO engineering company
NEWAYGO, MICHIGAN

. . . and profitable too, with NEWAY® MOLD HANDLING, SAND HANDLING AND CONDITIONING EQUIPMENT

FOUNDRY EQUIPMENT AND SUPPLIES DIGEST

For More Details on These Items Use Reply Card —Page 196



CAR SHAKER

Car shaker combines the impact features of shakers which operate on the top edges of the car only with the vibration features found in shakers which hang on the car side and are clamped to the underside of the car. Action is produced by rotating an unbalanced shaft at 1800 rpm. The shaft is fitted in two self-aligning bearings carried in housings which fit in two heavy side plates that rest on the upper edge of the car when the shaker is in operating position. The eccentric action of the shaker is carried directly to the car without going through any connections. The unbalanced shaft is driven by a 10-hp, totally-enclosed motor mounted on a spring-supported base. Made by **Eastern Constructors Inc.**, Poland, O.

For More Details Circle No. 401—Page 196

TEMPERATURE CONTROLLER

Mercury-actuated, air-operated indicating temperature controller is available in two basic types—on-off fixed high-sensitivity or proportional band. The controller can be changed from direct to reverse acting or vice versa without tools. The fixed high sensitivity controller is used on batch type processes while the proportional band type offers throttling control for continuous flow processes. Wall mounted in a cast aluminum case, the controller has standard ranges to 800° F. It is furnished with 5 ft of bronze connecting tubing, ¾-in. NPT chrome-plated union fittings and a stainless steel bulb for liquid immersion. A recording type model also is available. Made by **H. O. Trerice Co.**, 1420 West Lafayette Blvd., Detroit 16, Mich.

For More Details Circle No. 402—Page 196

REFRACTORY PLACEMENT

Aircreter gun pneumatically applies concrete and refractory materials that are dry or contain up to 5 per cent moisture. The gun places 1 to 6 cu yd per hr or about 1½ cu yd per 100 cfm of air. Special feed flow control adjusts material flow or cuts off material when free air is desired. Pressure is controlled by air regulator. Two sizes are made —large models for production work and portable models for patching and repairing jobs. Made by **Engineered Equipment Inc.**, Waterloo, Iowa.

For More Details Circle No. 403—Page 196

CASTING CART

Casting cart carries castings at an easy working height between work stations. Carts maintain casting segregation and dovetail to form a continuous, space-saving line in cleaning room operations. The pan on the cart is removable and can be placed on a roller-equipped pallet used with

Nomad conveyor systems. Carts are rubber tired and have a 700-lb capacity. Pan size is 22 in. wide x 32 in. long x 6 in. deep. Cart size is 22 in. wide x 43-in. long x 42 in. high. Made by **Nomad Equipment Division, Westover Corp.**, 3110 West Fond Du Lac Ave., Milwaukee 10, Wis.

For More Details Circle No. 404—Page 196

GAS TORCH

No. 70 gas torch weighs 4⅛ lb, is 50 in. long, lights instantly, requires no regulators and produces a flame up to 4 ft long at 100 lb pressure with a Btu input of 487,000 per hr. Torch can be used for drying molds, lighting furnaces, preheating, melting out joints in piping, thawing pipes and other similar applications. Made by **Insto-Gas Corp.**, 998 East Woodbridge Ave., Detroit 7, Mich.

For More Details Circle No. 405—Page 196

YARD CRANES

Yard and dock cranes are made in two models of 3 and 5-ton lifting capacities with 4 and 6-ton carrying capacities, respectively. Controls for

traveling, material hoisting, boom raising and swinging of load are at operator's fingertips. Over-the-road speeds up to 25 mph are attainable by each model. The smaller model has four forward speeds, one reverse speed, two-wheel hydraulic brakes and mechanical steering. The larger model has four forward speeds, one reverse speed, four-wheel hydraulic brakes and hydraulic power steering. Either model can be equipped with a generator and electric magnet for scrap yard operation. Made by **Hanson Clutch & Machinery Co.**, Tiffin, O.

For More Details Circle No. 406—Page 196

OPEN GEAR LUBRICANT

E Z Gear Coat is an open gear lubricant packaged in aerosol cans for applying an even coating where required. It is an all-weather, extreme pressure, heavy-duty lubricant whose properties assure protection against rain, snow, ice or hot weather. Reportedly it will not dissolve, crack, drip or be thrown off running gears on chain drives under extreme conditions. Made by **Swan Finch Oil Corp.**, 5849 West 66th St., Chicago 38, Ill.

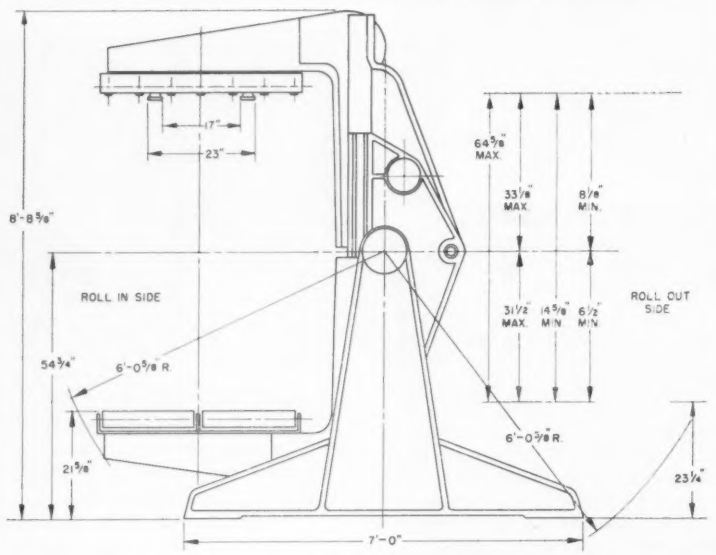
For More Details Circle No. 407—Page 196

SURFACE PLATES

Portable black granite-diorite surface plates are nonmagnetic, nonabrasive and surface lapped to an accuracy of 0.0002 in. Four sizes of the "Valu-Plates" are available from stock—8 x 12, 12 x 18, 18 x 24 and 24 x 36 in. Cabinet stands to permit use of the plates for on-the-spot inspection of parts in production can be supplied. Made by **DoAll Co.**, Des Plaines, Ill.

For More Details Circle No. 408—Page 196

Rollover Draw Unit Has a Full 24-in. Draw



Model 5024 floor-mounted Rol-A-Draw machine has a capacity of up to 5000 lb and handles patterns requiring up to a full 24-in. draw. Flask widths of up to 60 in. are accommodated and pattern lengths are unlimited because of the open end design of the machine. The machine stands 104 in. high and is installed above floor level to eliminate need for a pit. Roll-in and roll-out heights are at normal conveyor working levels, and the unit is designed for use with large multiple station molding or coremaking units.

Several pattern and corebox clamping systems are available to meet various requirements. Both roll-in and roll-out can be either at 90 or 180 degrees to the axis of rollover. If changes are required, they can be made in the field. All controls are located on a side frame mount that may be placed on either side of the machine.

A single control lever actuates the automatic clamping, equalizing, rollover and draw cycle. Automatic flask or corebox height adjustment and automatic flask or corebox equalization are features of the machine. Made by **Beardsley & Piper, Division of Pettibone Mulliken Corp.**, 2424 North Cicero Ave., Chicago 39, Ill.

For More Details Circle No. 474—Page 196

LITERATURE

Metal Melting Equipment

Bulletin 150 describes line of equipment for melting nonferrous metals in sand, die casting and permanent mold operations. Core ovens, oil burners, oil pumping units, ladle heaters and centrifugal blowers also are covered. — **Stroman Furnace & Engineering Co.**, 9900 Franklin Ave., Franklin Park, Ill.

For More Details Circle No. 409—Page 196

Flask Pins and Bushings

Catalog F-1030 contains illustrations, dimensioned drawings and tables covering many types of standard pins and bushings.—**Universal Engineering Co.**, Frankenmuth, Mich.

For More Details Circle No. 410—Page 196

Battery Buying Guide

Booklet, "So You're Going to Buy an Industrial Battery," contains information to help industrial battery buyers select the most economical and efficient battery. — **Gould-National Batteries Inc.**, Trenton 7, N. J.

For More Details Circle No. 411—Page 196

Used Foundry Equipment

Catalog lists and describes varied inventory of used and rebuilt foundry equipment. Coreblowers, core ovens, cleaning equipment, conveyors of all types, grinders, furnaces, molding machines, mullers, pattern equipment and sand conditioners are listed. —**AAA Machinery & Equipment Co.**, 15539 Saranac Rd., Cleveland 10, O.

For More Details Circle No. 412—Page 196

Aluminum Alloy

Chemical composition, typical properties, government specifications, applications and other facts about Apex aluminum alloy 417 are found in brochure.—**Apex Smelting Co.**, 2537 West Taylor St., Chicago, Ill.

For More Details Circle No. 413—Page 196

Welding Chart

Wall chart, EW-198, lists and gives instructions on use of electrodes including carbon and low-alloy steel, iron powder, hardfacing and buildup, cast iron, nonferrous and stainless steel. Hints on proper welding procedure, types of joints, typical positions and

For Foundrymen

common welding troubles are covered.—**Hobart Brothers Co.,** Troy, O.

For More Details Circle No. 414—Page 196

Furnace Fume Removal

"Why Live with Electric Furnace Fume Problems" describes how factors that have made fume control of these furnaces difficult in the past are overcome by Wheelabrator's Dustube Collector. —**Wheelabrator Corp.,** 1102 South Byrkit St., Mishawaka, Ind.

For More Details Circle No. 415—Page 196

Flameproof Material

Folder introduces Anti-Flame, a flameproofing product that is said to double the life expectancy of wooden bottom boards and flasks. —**Para Products Division, Foundry Rubber Inc.,** 5200 River Rd., Washington 16, D. C.

For More Details Circle No. 416—Page 196

Belt Conveyor Idlers

Construction features, sizes, dimensions and weights of line of belt conveyor idlers, including troughing, flat, self-aligning, rubber disk and return designs, are provided in bulletin 119.—**C. O. Bartlett & Snow Co.,** 6200 Harvard Ave., Cleveland 5, O.

For More Details Circle No. 417—Page 196

Industrial Trucks

Construction features, tables of specifications, capacities and attachment data for complete line of industrial trucks are presented in bulletin 57.—**Baker-Raulang Co.,** Box 5579, Cleveland 1, O.

For More Details Circle No. 418—Page 196

Dielectric Sand Core Oven

Competitive advantages possible through use of Foundromatic dielectric sand core oven are given in bulletin 15B7306D. — **Allis-Chalmers Mfg. Co.,** Milwaukee 1, Wis.

For More Details Circle No. 419—Page 196

Conveyor-Elevator

Advantages, general arrangements, capacity tables, horsepower formulas, dimensions and general information to aid in the selection of combination conveyor-elevator system for handling free flowing, dusty or granular material is found in book 150. — **Materials Handling Equipment Co.,** 2619 North Normandy Ave., Chicago 35, Ill.

For More Details Circle No. 420—Page 196

AUTOMATIC OILER

"Inject-O-Mist" oiler for pneumatic portable tools attaches directly to the tool, requires no special oil and works on all portable pneumatic tools that operate on the intermittent principle. It weighs 5 oz and measures 1⅝ in. wide x 1⅝ in. high x 3¼ in. long. Other features are operation at all line pressures without adjustment; lubricates tool in any position, with or against gravity; adjusts to proper lubrication for tool; eliminates oil in air lines and hose; breaks oil into a microscopic mist and injects it into the tool with each impulse. Made by **Carlson Products Co.,** 5309 North 24th St., Omaha 10, Nebr.

For More Details Circle No. 421—Page 196

MOTOR PROTECTING RELAY

Motor protecting relay protects any three-phase induction motor against failure due to shaft overload, voltage unbalance and/or single phasing. The instrument employs the basic principles of symmetrical components to effect the drop-out of any motor that approaches the stage of dangerous overheating from either one or any combination of all three of the above faults. Each unit is custom built to meet the nameplate data of the motor for which it is intended. Made by **Electrical Service Co.,** Ardis Heights, Greenville, Tex.

For More Details Circle No. 422—Page 196

BLOWGUN

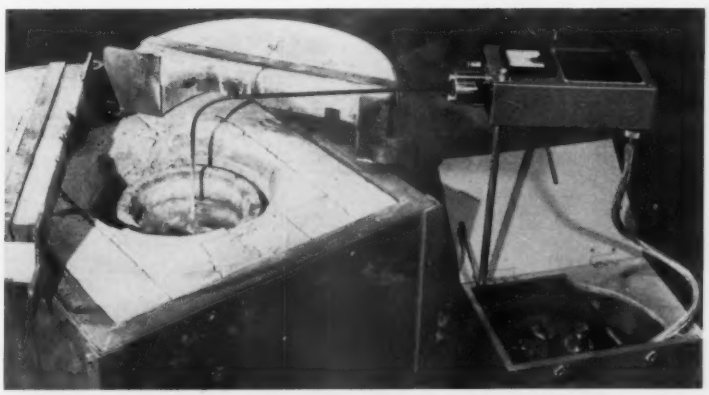
Safe-T-Air blowgun is designed for clearing working surfaces and parts of waste cuttings, dust and particles. Forty per cent of the air intake forms a protective screen whenever the trigger is depressed to shield the operator from flyback. Made by **E. V. Nielsen Inc.,** 129 Broad St., Stamford, Conn.

For More Details Circle No. 423—Page 196

CRUCIBLE COATING

Protective chemical inner face coating resists dross adherence in crucibles and assures easier and more thorough cleaning of crucibles. Crucibles still must be cleaned after

Unit Measures Aluminum Hydrogen Content



COMPACT, PORTABLE instrument for determining the hydrogen content of aluminum and aluminum alloy melts is entirely self-contained and requires no sampling of the molten metal. Direct readings are obtained by dipping a probe in the melt and turning a handle for two or three minutes. The instrument thus provides foundry floor data that is rapid and invaluable when modifications of gas content within the melt are necessary to meet soundness specifications.

In operation, the Telegas unit depends on the diffusion of hydrogen from the melt into nitrogen bubbles. The instrument circulates a stream of bubbles through the melt and then into an electrical gas content determination apparatus. Hydrogen diffuses into the nitrogen until an equilibrium pressure is reached, this pressure being proportional to the gas content of the melt. The nitrogen is circulated through a pumping system of very small volume to reduce pumping time.

All the operator has to do is dip the probe into the metal and turn a handle. From the hydrogen equilibrium pressure reading and the temperature, the gas content may be determined from tables provided. Made by **Edwards High Vacuum Ltd.,** Manor Royal, Crawly, Sussex, England.

For More Details Circle No. 475—Page 196

each heat, but dross adheres less tightly. New line of crucibles, called Ezi-Kleen, is being made in any desired size. Chemically treated surfaces to which dross does not adhere reportedly prolong crucible life. Made by **Electro Refractories & Abrasives Corp.**, 344 Delaware Ave., Buffalo 2, N.Y.

For More Details Circle No. 424—Page 196

SAFETY BOOT

High safety boot, H960, has a height of 12 in. to provide leg as well as foot protection. Brass rivets lend strength to the vamp of the boot. An oil-resistant composition sole offers increased durability through reinforced nailing. A tough outside pocket shields the counter. Protection to the toes is provided by a steel box toe. Leather insole is sweat resistant and the lining is mildew proof. Made by **Hy-Test Safety Shoes**, 1509 Washington Ave., St. Louis 3, Mo.

For More Details Circle No. 425—Page 196

FIRE CONTROL POWDER

A piped fire extinguishing system using Met-L-X dry powder is designed to give maximum protection against metal fires in areas where use of manual extinguishers is impossible because of radiation hazards or because of the denser, caustic smoke characteristic of liquid-metal fires. The system may be activated manually or by heat-actuating devices. The system extinguishes liquid metal fires by discharging dry powder through nozzles installed over the hazard areas. Piping is situated to coat all vertical surfaces and at the same time distribute an even layer over flooring to guard against fire from spilled metal. Made by **Ansul Chemical Co.**, Marinette, Wis.

For More Details Circle No. 426—Page 196

ALL-AIR VALVE CIRCUIT

All-air circuit to provide safety for operators of presses, brakes, shears and other machines features a non-tie-down special purpose valve, a single stroke valve and a three-way poppet palm button valve arrangement. The circuit assures increased operator safety because it requires two-handed operation to cause a machine cycle. Only one stroke occurs regardless of how long the palm button valves are held down. The buttons must be released to clear the circuit and again depressed to allow another stroke. A variety of valve arrangements can be engineered to meet requirements. Made by **Ross Operating Valve Co.**, 107 East Golden Gate Ave., Detroit 3, Mich.

For More Details Circle No. 427—Page 196

Metal Buildings Are Delivered as a "Package"

ALL-METAL "standard building" can be delivered "off the shelf" to the job site about two or three weeks after ordering. Buildings are delivered as a "package" —all siding, roofing, windows, doors and hardware are included. To facilitate erection on the site, the manufacturer's construction men and engineers are on hand when buildings are delivered. The only work required of the customer is to provide the floor or base for the buildings.

Pre-engineered building components in standard sizes have been stock-piled to provide rapid delivery. Building widths run 32, 36, 40, 44 or 48 ft. Heights of 12 and 14 ft are available. Length is unlimited as the ends can be extended easily. Rigid frame design provides unobstructed head room for storage or machinery.

All windows and doors are available in a number of sizes, types and locations. Industrial doors can be swing or slide type. Made by **Republic Steel Corp.**, Truscon Division, 1315 Albert St., Youngstown, O.

For More Details Circle No. 476—Page 196

LITERATURE

Shell Molding

Brochure on shell molding with silicone parting agents includes recommendations for cleaning and breaking-in patterns and suggestions for obtaining easy release of sand-resin shells of high dimensional accuracy. — **Dow Corning Corp.**, Midland, Mich.

For More Details Circle No. 428—Page 196

Sand Reclamation Unit

Engineering features, operating advantages and versatility of Pneu-Reclaim foundry sand reclamation systems are found in bulletin 2000.—**Beardsley & Piper Division, Pettibone Mulliken Corp.**, 2424 North Cicero Ave., Chicago 39, Ill.

For More Details Circle No. 429—Page 196

Recirculating Ovens

Construction features, capacities and dimensions of electric, gas, oil or steam standard truck type recirculating ovens are provided in bulletin 126.—**W. S. Rockwell Co.**, 200 Eliot St., Fairfield, Conn.

For More Details Circle No. 430—Page 196

Concrete Storage Bins

Engineering features, construction techniques, and tables of capacities in relation to bin diameters, heights and weights of materials for concrete stave storage bins found in bulletin.—**Neff & Fry Co.**, 214 Elm St., Camden, O.

For More Details Circle No. 431—Page 196

Abrasive Chips

Specifications and production advantages of Tumbrade 40 abrasive chips and triangular media for precision, mass-production barrel finishing of ferrous and nonferrous castings and die castings are offered in bulletin.—**Macklin Co.**, Dept. 22, Jackson, Mich.

For More Details Circle No. 432—Page 196

Car Unloading System

Pneumatic conveying system for unloading cars of dry pulverized and granular materials is illustrated and described in bulletin 174.—**Sprout, Waldron & Co.**, Muncy, Pa.

For More Details Circle No. 433—Page 196

Fire Protection Systems

Bulletin 66, "The ABC of Fire Protection," discusses the advantages of fire protection, explains the insurance saving and other economic benefits that protection

For Foundrymen

makes possible, and describes a range of protection systems and components. — **Automatic Sprinkler Corp. of America,** Youngstown 1, O.

For More Details Circle No. 434—Page 196

Foundry Plastics

"Plastics in the Foundry Industry" contains data on time and labor savings, production experiences in constructing molds and preparing mold surfaces and fabrication methods for core driers, coreboxes, matchplates, patterns and core prints.—**Marblette Corp.,** 37-21 Thirtieth St., Long Island City 1, N. Y.

For More Details Circle No. 435—Page 196

Engineering Service

Bulletin 102 highlights engineering experience available to management seeking assistance with plant engineering, architectural engineering, construction, modernization, mechanization, material handling or automation.—**Lester B. Knight & Associates Inc.,** 549 West Randolph St., Chicago 6, Ill.

For More Details Circle No. 436—Page 196

Pistol Sprayers

Information sheet illustrates and describes a pistol sprayer and a spray gun that have a multitude of foundry applications including spraying cores and molds, cleaning permanent molds, light blasting and air cleaning.—**Jas. A. Murphy & Co.**, 1421 East High St., Hamilton, O.

For More Details Circle No. 437—Page 196

Refractories

Bulletins 320 and 321 illustrate, describe and provide directions for use of Taycor 414 Hydrocast, a super refractory castable for service to 3350°F, and Tayco Foundry Patch, a general purpose, heat-setting patch, respectively. — **Chas. Taylor Sons Co.,** Box 58, Annex Station, Cincinnati 14, O.

For More Details Circle No. 438—Page 196

Gas Regulators

Catalog 806 covers line of pressure regulators for industrial compressed gases. Cylinder, manifold and pipeline regulators, both single and two-stage, and a variety of specialized equipment are detailed.—**Air Reduction Sales Co., Division of Air Reduction Co.,** 150 East 42nd St., New York 17, N. Y.

For More Details Circle No. 439—Page 196

ELECTRIC HOISTS

Low headroom requirements and needle-threading precision are features of redesigned electric hoists in capacities from 3 to 15 tons. Special purpose hoists with capacities from 20 to 150 tons also are available. Low headroom feature is achieved by a flat U-shaped arrangement of the motor, gear box and drum. The motor and drum are parallel mounted on the same side of the gear box, permitting the load block to retract between them. Hoists are built for all-weather operation and are available with plain trolley, hand-geared trolley, motor trolley, deck, lug and hook mountings. Made by **R. G. LeTourneau Inc.,** 2399 South MacArthur, Longview, Tex.

For More Details Circle No. 440—Page 196

MAGNETIC INSPECTION

Magnetic inspection supplies include red, yellow, gray and black powders; red and black paste and fluorescent paste and powder; bulb-type powder dispensers; colored inspection tapes, tags and dispensers and a gun-type powder blower. Items are intended for users of Sonoflux instruments and for other types of magnetic inspection apparatus. Made by **Sonoflux,** Box 14543, Houston 21, Tex.

For More Details Circle No. 441—Page 196

HEAT-MARKING CRAYONS

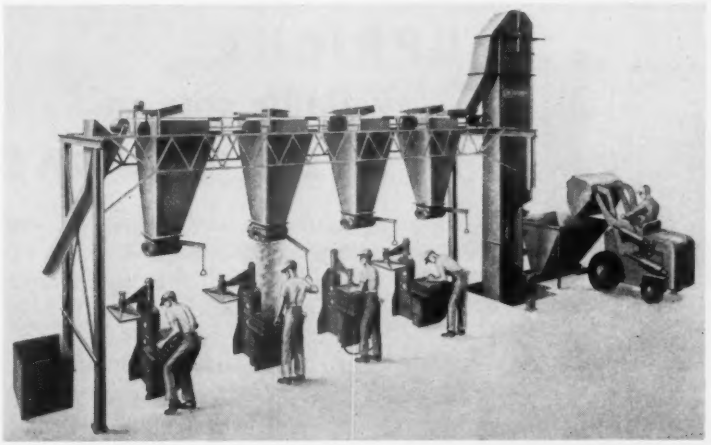
Solid marking crayons for use on all types of hot metal where extreme temperatures and subsequent outside storage are involved are made in ten colors that withstand 900 to 1200° F. Made by **Ace Laboratories,** 1614 Coutant Ave., Lakewood 7, O.

For More Details Circle No. 442—Page 196

WOODEN PALLETS

"Fine-Sawn" pallets are uniform in size and made of select, moisture-controlled lumber and assembled with cement-coated, extra hard wire, screw drive nails. Processing machinery gives the pallets a "flocked," non-slip surface which helps prevent cartons, bags, etc., from slipping. Deckboards and stringers are wax-tipped

Units Put Overhead Sand at Molders' Stations



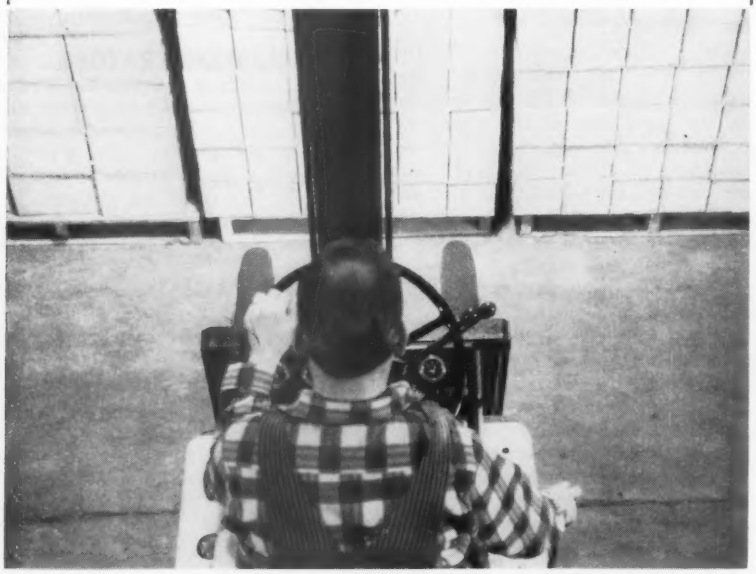
OVERHEAD SAND units are designed to increase production by providing overhead sand for molding stations and eliminate piling of sand on the floor (to free floor space for other productive work).

Conditioned sand from the sand preparation plant is delivered by front-end loader and dumped into the feeder hopper. From the hopper, it is discharged by a mechanical vibrating conveyor with a stainless steel pan to a vertical belt-type bucket elevator equipped with malleable iron buckets. From the head of the bucket elevator, sand is discharged through a chute onto a flat belt conveyor equipped with plows for diverting sand into each molder's hopper.

The molder pulls a lever of the clam shell valve to get sand from the overhead hoppers. No shoveling is necessary. Built as a package unit, sound engineering principles have been followed in design of all components. The unit is available without belt conveyor for two stations and with belt conveyors for four to eight stations. Made by the **Foundry Division, Jeffrey Mfg. Co.,** 907 North 4th St., Columbus 16, O.

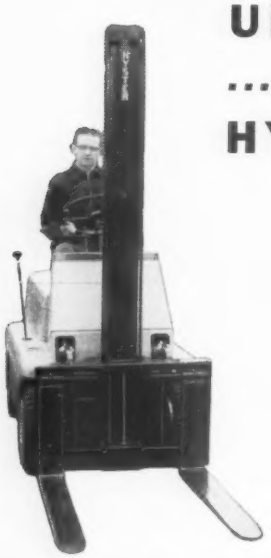
For More Details Circle No. 477—Page 196

now this is **Visibility!**



. . . with MONOMAST® UPRIGHT

. . . available only on HYSTER TRUCKS



HYSTER MONOMAST UPRIGHT
The greatest basic lift truck advance in 25 years

A lift truck operator has to *see* what he is doing to work efficiently. *The better he can see, the more work he can do in a day.*

With the "Monomast" Upright, the operator always has full view of the forks and load. Safety and maneuverability are greatly increased. Operator fatigue is reduced.

"Monomast" *superior visibility* means faster approach, more accurate placing of loads, less package damage—*far more tons moved per hour.*

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DANVILLE, ILLINOIS
PEORIA, ILLINOIS
NIJMEGEN, THE NETHERLANDS

to increase useful life and utility by sealing the ends to control moisture and stabilize the wood. Made by **Sterling Lumber & Supply Co.,** 11900 South Halsted St., Chicago 28, Ill.

For More Details Circle No. 443—Page 196

SAND RAMMER

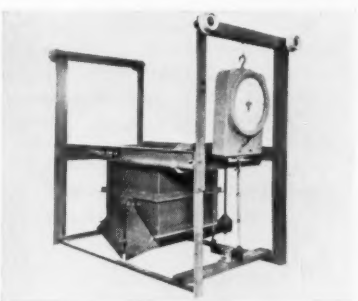
Compact sand rammer contains a double-action seal against sand and dirt. A front seal of neoprene felt

wipes the surface of the piston rod clean and prevents entrance of any sand or dirt into the bore of the guide or barrel. Behind this sand wiper seal is an air seal, a leather ring encircling the piston rod. Tool is cooled through a built-in cooling system. The exhaust air, cooled by expansion, is led through the barrel into an annular exhaust chamber to cool the barrel at hand-hold position. Three sizes are manufactured. Made by **Ingersoll-Rand,** 11 Broadway, New York 4, N. Y.

For More Details Circle No. 444—Page 196

PORTABLE SCALE

Portable scale for weighing heavy bulk materials at storage bins located at scattered points within a plant can handle loads from 200 to 1000 lb. To perform a simple weigh-

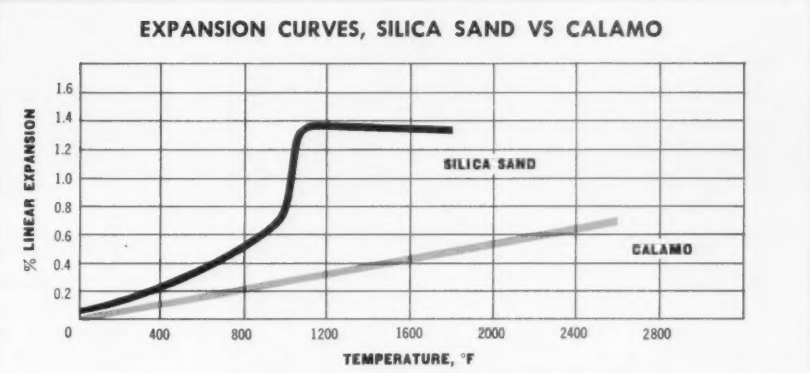


ing, the scale is wheeled to a storage bin, loaded with a desired amount of material and moved to the processing equipment where the scale contents are discharged through clam shell gates. Discharge may be by hand lever or air cylinder. In weight proportioning operations, scale is wheeled from bin to bin, and desired

Harbison-Walker

REFRACTORY MOLD MATERIALS

for metal casting



Calamo

CALAMO, one of the extensively used Harbison-Walker products for molding is an alumina-silica refractory of optimum sizings for various molding mixtures. Its fusion point is 100°F. higher than that of normal silica sand mixes.

The chart above shows the exceedingly desirable expansion curve of CALAMO as compared with that of silica sand.

CALAMO, used as the major constituent of precision casting investment mixes, improves the dimensional constancy of the molds, makes them stronger and more resistant to erosion by metal flow. Investment costs are measurably reduced because an appreciably lesser amount of bonding agent is needed. This is attributable to the very desirable particle sizing and the equiaxed, dense grains of CALAMO.

CALAMO, used alone or as the major part of conventional dry sand molding mixes in rammed or in slinger-placed sand molds, provides not only the very desirable low thermal expansion characteristics particularly suited for precision casting but also provides the required refractoriness for metals and alloys which are melted at unusually high temperatures.

H-W Moldsand Bond

H-W MOLDSAND BOND is a highly refractory clay having unusual plasticity and bonding strength for conventional molding. Used alone or with other binders, it imparts enhanced hot strength to molds and in some mixes replaces, wholly or in part, binders of higher cost. It is used with equally good results for the usual rammed mixes with sand or CALAMO. Molding mixes made with H-W MOLDSAND BOND have decidedly improved storage properties.

Write us for information regarding other Harbison-Walker products—mold wash materials—ceramic molding media—shell molding minerals.

HARBISON-WALKER REFRACTORIES COMPANY
AND SUBSIDIARIES
GENERAL OFFICES: PITTSBURGH 22, PENNSYLVANIA

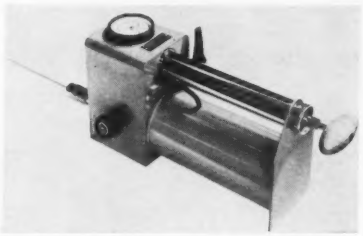
World's Most Complete Refractories Service

amounts of material are weighed cumulatively. Large spring dial provides operator with means of checking individual weighings. An accuracy within 1¼ lb per 1000 lb is possible. Made by **Richardson Scale Co.**, Clifton, N. J.

For More Details Circle No. 445—Page 196

FLUIDITY TESTER

Ragone fluidity tester provides foundrymen with a tool to quickly, reliably and easily measure the fluid-

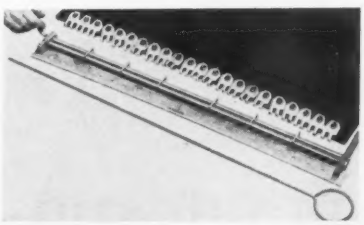


ity of metals by using a controlled partial vacuum to pull a sample of metal into a preformed precision pyrex tube. The tester is self-contained and portable. It weighs 9½ lb. The uncontaminated sample may be used for chemical analysis if desired. Made by **Harry W. Dietert Co.**, 9330 Roselawn Ave., Detroit 4, Mich.

For More Details Circle No. 446—Page 196

ALIGNING HOLDER

Aligning holder is said to speed and ease the application of Flexco hinged conveyor belt fasteners. Claimed advantages are: All fasten-



ers are kept in proper alignment while nuts are being run down; hinge pin is inserted easily because all fasteners are assembled in proper alignment; a 500 Templet is an integral part of the holder so that both tools can be had as one unit. The aligning holder is made in one size for belts up to and including 36 in. wide. Made by **Flexible Steel Lacing Co.**, 4607 Lexington St., Chicago 44, Ill.

For More Details Circle No. 447—Page 196

AUTOMATIC COUNTERS

Accurate automatic counting devices are for any operation controlled by pneumatic or hydraulic action;

Silvery Pig Iron

Originated 84 years ago, Globe Silvery Pig Iron has remained in a class by itself. It provides accurate silicon control with all grades ranging from 6 to 16% silicon.

A skilled metallurgical staff is available to help you select the correct grade for your specific requirements.

- **Made from all-virgin ore.**
- **Uniform structure — uniform melting and even silicon distribution.**
- **Readily identified and easily handled by magnet or hand.**

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Erie • Greensboro • St. Louis • Washington

IRON ORE • PIG IRON
COAL • COKE • FERROALLOYS

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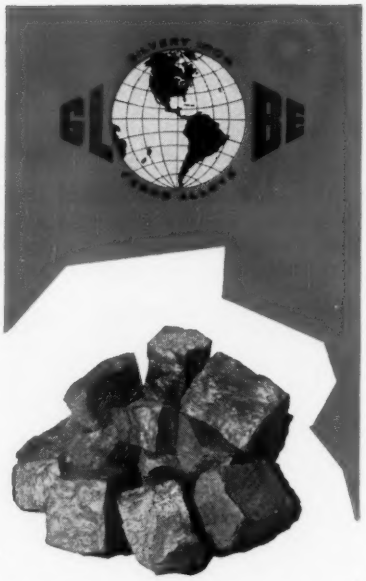

Ferroalloys

Ferrosilicons
High-Carbon Ferrochromes
Low-Carbon Ferrochromes
Low-Carbon Ferrochrome Silicons
Silicomanganese
Other Specialty Alloys

Thoroughly modern, the plant at Beverly, Ohio, is ideally situated to distribute its diversified ferroalloy products by rail, water, and truck.

It is staffed by highly competent operators, research, and metallurgical engineers who are available for consultation on your needs.

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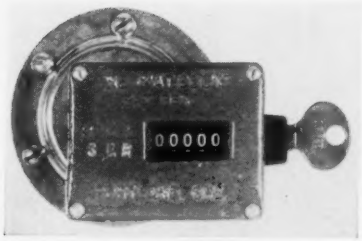
IRON ORE • PIG IRON
COAL • COKE • FERROALLOYS

Circle 676 on Inquiry Card—Page 51

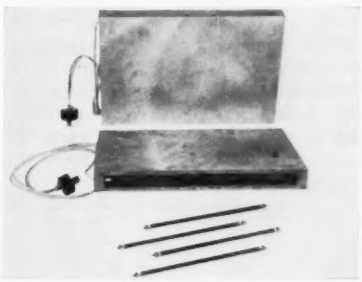


they can be attached easily to automatic molding machines and jolt squeeze machines. Counters screw into the line controlling any air or hydraulic cylinder. There is no linkage to assemble or get out of adjustment, no solenoid, no possibility of half or miscounts. Models are available from 10 to 500 lb and for up to 300 counts per minute. Made by **Pneumaticount,** 3400 North East 54th Ave., Portland 13, Oreg.

For More Details Circle No. 448—Page 196

HEATER PLATENS

Cast aluminum alloy heater platens with cast-in tubular element heaters are for use on Model H1-1622 automatic shell molding machine. Heaters furnish 4500 w per platen. Platen size is 11 x 17 x 1½ in. thick. Maxi-



mum temperatures of 675°F at 32 per cent input are possible. Platens are furnished completely wired, ready for plug in. Standard current is 115 v, 60 cycle, single phase but 220 or 440 v units can be supplied to specification. Platens are ground on both sides and all terminals are protected by cover plates. Made by **C & S Products Co.,** 18656 Fitzpatrick Ave., Detroit 28, Mich.

For More Details Circle No. 449—Page 196

HYDRAULIC TRANSMISSION

Hydraulic, three-element, torque-converter-drive transmission is for use in powered equipment. The converter and directional change transmission can be furnished matched to various air-cooled and liquid-cooled engines, and is designed for simplified coupling to engine and final drive. Directional change is accomplished by a dual multiple-disc clutch arrangement which is controlled by a single forward, neutral, reverse position lever. Compact design of the transmission makes it adaptable to smaller equipment in the 15 to 30-hp range. Made by **Prime Mover Co.,** Muscatine, Iowa.

For More Details Circle No. 450—Page 196

FACE SHIELD

Face shield for grinding and other hazardous occupations features a Fiberglas spark guard that minimizes moisture and heat absorbing characteristics. The No. 32 shield provides 19 in. of coverage around the face, with a choice of 8 or 10 in. window height. Ratchet adjustment provides headgear with comfortable, but exact fit. Windows are supplied in green or clear shades. Made by **Sellstrom Mfg. Co.,** Palatine, Ill.

For More Details Circle No. 451—Page 196

DISCHARGE VARISTOR

Disk type discharge varistor assembly for direct installation in electrical circuits protects motors, generators, lifting magnets, magnetic

Cut foundry operating costs . . .

Transite Core Plates are strong and durable . . . resist warpage, impact and abuse, provide long service life.

with Transite Core Plates and Slip Jackets

"Johns-Manville Transite* Core Plates help assure maximum production in minimum time"—that's the experience of foundrymen who have used them for years. Made of asbestos and cement, they are light in weight, yet strong and durable. Being non-metallic, they resist corrosion, maintain their smooth surface and can be easily cleaned.

Transite Slip Jackets are a companion product with similar advantages. They do not burn, retain their original shape despite runouts. Slip jackets are furnished in both white and black types. The latter is widely used as a protective liner for metallic slip jackets.

FREE . . .
New Folder
gives complete details on Transite Core Plates and Slip Jackets—as well as Transite Pallite products for dielectric furnaces. For your copy of folder PP-31A, write Johns-Manville, Box 14, New York 16; in Canada, 565 Lakeshore Road East, Port Credit, Ontario.

Transite Slip Jackets cost less than other types . . . last longer, too. Result—important savings for foundries.

*Reg. U. S. Pat. Off.

JM PRODUCTS **Johns-Manville TRANSITE** CORE PLATES AND SLIP JACKETS

chucks, solenoids, large coils, relays, etc., against high inductive surges resulting from sudden interruptions of inductive currents. The resistor is made as a family of ready-mounted groups of one to four resistors, connected in series or parallel. The 3-in. disks, which range from 0.080 to 0.375-in. thick, are bracket-mounted on a horizontal insulated bolt with a spring lock washer to provide contact pressure. Made by **General Electric Co., Metallurgical Products Dept.,** Detroit 22, Mich.

For More Details Circle No. 452—Page 196

FLAME CUT-OFF MACHINE

Semiportable flame cut-off machine consists basically of an 18-in. structural steel guide rail, a carriage and a torch truck that travels on a boom. Unit has a control assembly that permits its operation from a central position. Operator controls the torch from the control assembly, adjusts torch height and travel speed and positions the torch to begin cutting at the desired point. Torch can be adjusted through a vertical distance of about 7 ft. Torch truck will

move along the boom for 8½ ft. The unit is used for cutting stainless steels, alloy steels, cast iron, skulls, thimbles and other scrap containing pockets of slag or refractory materials. Made by **Deitch Co.,** 20th St. and Allegheny River, Pittsburgh, Pa.

For More Details Circle No. 453—Page 196

LIFT TRUCK BRAKE

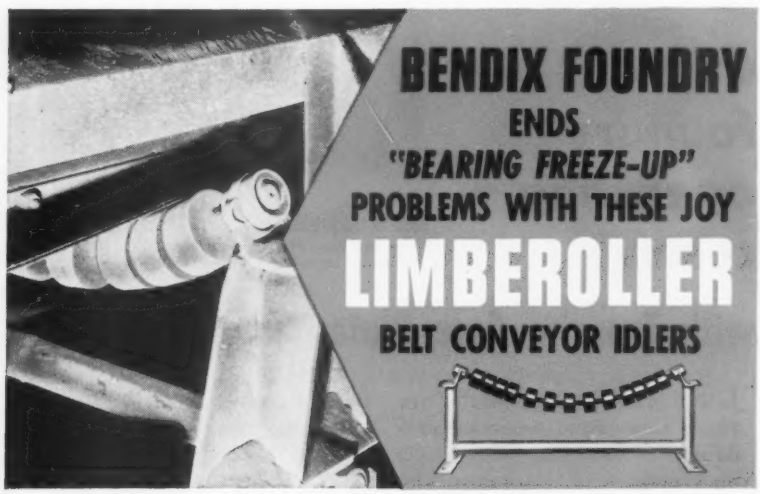
Automatic brake for fork lift trucks stops the vehicle any time the operator is off the seat. Lift truck will remain stationary until the operator is ready for the next start even if a heavy box or object falls on the seat accidentally. Brake control valve is not controlled by the seat action but by a brake release valve. The system energizes the main hydraulic brakes and is nonelectric. There is no drain on the battery and no danger of fire through short circuiting. Brakes will stop the truck irrespective of the gas pedal position. Load requirements need different pressure applications. Made by **Fluid Control Co.,** 26 East 18th St., Chicago 16, Ill.

For More Details Circle No. 454—Page 196

DUST COLLECTING SYSTEM

Self-contained dust collecting system for use with grinder installations arrests grinding grit and dust at its source. The cabinet containing

the collection system serves as the base for the grinder. Floor space compares with the conventional grinder. The Grind-Air-resters, as the units are labeled, are available in 7, 8, 10,



At Bendix Aviation Corporation's South Bend plant, foundry sand was lodging in steel belt idlers, causing them to freeze up. Replacing just one steel idler required a two hour shutdown. Frozen idlers sometimes cut through the belt making complete belt replacement necessary.

During a single weekend Bendix replaced *all* the steel idlers with Joy Limberoller idlers. The Joy Limberoller is a single roll idler consisting of pressure-molded neoprene discs on a flexible steel cable which turns on its own axis. Only two bearings are used and these are up out of the dirt zone.

Two years later Bendix reported, *"No Limberollers have been replaced—not one belt has been torn by an idler—inspection and lubrication tours have been discontinued."*

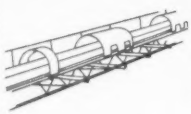
The Limberoller idler works equally well with other difficult materials—coal or chemicals—ores or fertilizers. What's *your* materials-handling problem? For detailed booklet on Limberoller Idlers, write ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

WSW L6454-149

Get Bulletin 149-13

JOY...EQUIPMENT FOR ALL INDUSTRY

INDUSTRIAL COMPRESSORS



CONVEYORS

ELECTRICAL CONNECTORS

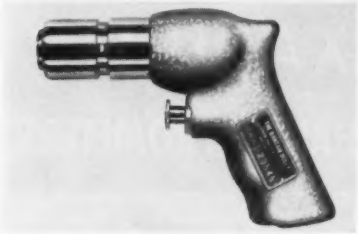
FANS AND BLOWERS

12 and 14 in. sizes. Made by **Standard Electrical Tool Co.**, 2488 River Rd., Cincinnati 4, O.

For More Details Circle No. 455—Page 196

BANTAM AIR HAMMER

Lightweight air hammer with a metering trigger weighs 20 oz, is 6 in. long, uses 6.5 cfm at 90 psi and is used for scaling, chiseling, peening, star drilling and metal cut-

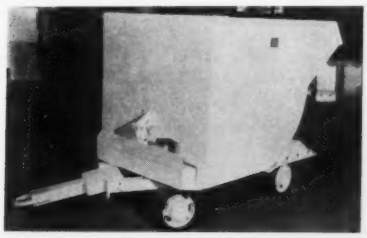


ting. A slip chuck snaps the various tools in or out easily and can be locked in eight different positions. The metering trigger lets the operator control blows from 0 to 13,000 per minute with light pressure from the finger. Made by **Superior Pneumatic & Mfg. Inc.**, 4758 Warner Rd., Cleveland 25, O.

For More Details Circle No. 456—Page 196

DUMP HOPPER BOX

A 1½-cu-yd hopper-box has been combined with a 3-ton trailer to provide ruggedness with maneuverability in handling castings or other concentrated loads. The unit can be



towed by a lift truck or plant mule. Its trailer steers at one end and will not tip regardless of the load distribution. An automatic safety lock permits easy and instantaneous dumping of the load. Hopper is 45 in. wide x 55 in. high x 64 in. long. Trailer has bearing mounted, 12 x 5 solid rubber tires on 1¾-in. axles. Made by **Salem-Brosius Inc.**, 30 Arch St., Carnegie, Pa.

For More Details Circle No. 457—Page 196

EMERGENCY LIGHT UNIT

Automatic emergency lighting unit assures instantaneous light when regular power fails. Unit is powered by a storage battery built into the

This Little Pig
Goes A Long Way!
The new 10 lb. pigs of Spiegeleisen (Manganese 19/21%) provide a convenient, accurate and economical means of adding Manganese to cupola or furnace charge.
"Spiegel" prevents oxidization, speeds production and greatly increases toughness and impact strength of castings.
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portable set. A trickle charger maintains the charge of the battery when the unit is plugged into any alternating current circuit. A built-in hydrometer indicates the state of the battery at a glance. Lights are sealed beam of 100 cp and will pro-

QUICK— ACCURATE Temperature Readings in Non-ferrous Molten Metals with

XACTEMP

HAND PYROMETERS

Accurate Dr. Mathias & Precision-Built Scale Division

Fielden Instrument Division, Robertshaw-Fulton Controls Co., 2920 North 4th St., Philadelphia 33, Pa.

For More Details Circle No. 460—Page 196

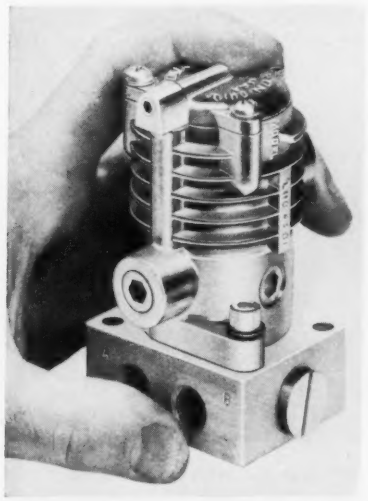
SOLUBLE OIL MIXER

Soluble oil mixer consists of a noncorrosive brass mixing head that has an intake for water, an intake for soluble oil, a mixing chamber and a dispensing outlet from which the mixture is expelled automatically. To operate, the unit is inserted into a drum of soluble oil and the water line connected to the mixer water intake. Dial on the mixer head is set and the water turned on. As water flows through the unit, a vacuum is created to draw oil from the drum into the mixer where it is combined with the water in the correct proportion to form a uniform emulsion. Made by **Force-Flow Inc.,** Box 2442, East Cleveland 12, O.

For More Details Circle No. 461—Page 196

CONTROL VALVE

Pilot-operated four-way valve is said to be ideal for controlling small double-acting cylinders and similar devices. Called the Bantam 4-way, the valve is 4 in. high and weighs 30 oz. It has three working parts. Its four-way action is achieved with a single solenoid pilot and a pressure-balanced shuttle in the valve body.



Valve body is anodized aluminum and moving parts are stainless steel with Hycar seals. Solenoid pilot, with coils for alternating or direct current, any voltage, is interchangeable with standard Speed King pilots and is built to JIC standards. Bantam valves are designed for two-point mounting and may be used with pressures from 15 to 140 psi. All ports

decrease your scrap ratio . . . . .
with FOUNDRIES MATERIALS CO.

KORWELD
CORE PASTE

IN YOUR FOUNDRY,
which shall it be?

490cc of gas evolved per gram of core paste used, or 85cc per gram (with Korweld)?

HOW MANY GRAMS OF CORE PASTE DO YOU USE IN YOUR CORE ASSEMBLY?

KORWELD proved 3 ways Better:

1. KORWELD PENETRATES DEEPER. Actually welds core seams for greater tensile strength.
2. KORWELD DRIES FASTER. Cuts waiting time, and steps up your production.
3. KORWELD DEVELOPS LESS GAS. Up to 60% less! Provides more moisture resistance.

HERE'S PROOF OF PERFORMANCE
The manager of a leading foundry* writes: KORWELD reacts exactly as you claim, i.e.; low gas evolution, high tensile, moisture resistance, and extremely easy to work with. KORWELD has definitely decreased our scrap ratio.

BUY FMC

For better castings, stepped up production, less scrap, and lower cost, ORDER A TRIAL BARREL OF KORWELD TODAY. You'll find it pays!

*Name on request.

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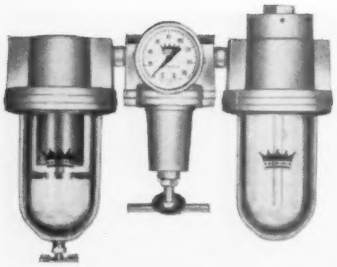

NEW *Crown* BULLETINS TELL HOW...

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Bulletin 301

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COMPLETE RANGE OF SIZES

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Send me your Crown Bulletins and name of nearest distributor.

Name.....

Position.....

Firm.....

Address.....

City.....*State*.....

Circle 680 on Inquiry Card—Page 51

portable set. A trickle charger maintains the charge of the battery when the unit is plugged into any alternating current circuit. A built-in hydrometer indicates the state of the battery at a glance. Lights are sealed beam of 100 cp and will pro-

vide continuous light for 10 hr. Made by **General Scientific Equipment Co.**, 7516 Limekiln Pike, Philadelphia 50, Pa.

For More Details Circle No. 458—Page 196

INDUSTRIAL FANS

SP-7 semipressure fans for applications against static pressures normally considered above the range of propeller type fans are said to be effective in the medium pressure range up to 4 in. S.P. Motors are rated adequately for operation throughout the entire static pressure range without overload. Maximum air moving efficiency is obtained by seven-bladed airfoil propellers. Available in direct-connected, direct-driven duct, belt-driven duct, "Bi-Flo" duct and extended shaft types, the fans are offered in a wide range of sizes from 14 to 60 in. in diam. Made by **Aerovent Fan Co.**, 700 East Ash St., Piqua 27, O.

For More Details Circle No. 459—Page 196

LEVEL CONTROL SYSTEM

Combination pneumatic - electronic level controller for use in Class I, Group C and D and Class II, Group E, F and G hazardous locations is explosion-proof. It is capacitance-actuated and will convert the smallest change in level into a proportional air output. It is being used to control the level of liquids including water, acids, alkalis, oils and aqueous solutions. Installed with special probes, the level controller has been used with granular solids. Made by

QUICK— ACCURATE Temperature Readings in Non-ferrous Molten Metals with

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HAND PYROMETERS

Accurate to Within a Fraction of a Scale Division

The XACTEMP PYROMETER makes possible better quality control and helps toward elimination of blowholes, burnouts, sand infiltration and other flaws due to incorrect temperature . . . affords a simple, effective means for accurate temperature measurement of molten, non-ferrous metals. Well-balanced, easy to handle . . . always ready for use and requires no preliminary adjustments.

Cast aluminum and brass construction. Indicator is of medium resistance not affected by thermocouple length . . . acts rapidly . . . provided with Alnico V magnet and direct reading dial starting at 50° F. 43" stainless steel extension . . . standard 7" Marshall tip permits true readings below surface of metal. Made to give good service for years. Order at once to be sure of immediate delivery from stock.

Catalog No. MM701 $68.50
Complete with Thermocouple. .

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Circle 681 on Inquiry Card—Page 51

Fielden Instrument Division, Robertshaw-Fulton Controls Co., 2920 North 4th St., Philadelphia 33, Pa.

For More Details Circle No. 460—Page 196

SOLUBLE OIL MIXER

Soluble oil mixer consists of a noncorrosive brass mixing head that has an intake for water, an intake for soluble oil, a mixing chamber and a dispensing outlet from which the mixture is expelled automatically. To operate, the unit is inserted into a drum of soluble oil and the water line connected to the mixer water intake. Dial on the mixer head is set and the water turned on. As water flows through the unit, a vacuum is created to draw oil from the drum into the mixer where it is combined with the water in the correct proportion to form a uniform emulsion. Made by **Force-Flow Inc.,** Box 2442, East Cleveland 12, O.

For More Details Circle No. 461—Page 196

CONTROL VALVE

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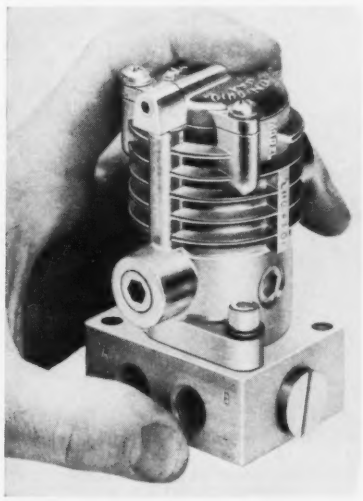

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decrease your scrap ratio . . . . .
with FOUNDRIES MATERIALS CO.

KORWELD
CORE PASTE

IN YOUR FOUNDRY,
which shall it be?

490cc of gas evolved per gram of core paste used, or 85cc per gram (with Korweld)?

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2. KORWELD DRIES FASTER. Cuts waiting time, and steps up your production.
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HERE'S PROOF OF PERFORMANCE
The manager of a leading foundry* writes: KORWELD reacts exactly as you claim, i.e.; low gas evolution, high tensile, moisture resistance, and extremely easy to work with. KORWELD has definitely decreased our scrap ratio.

BUY FMC

For better castings, stepped up production, less scrap, and lower cost, ORDER A TRIAL BARREL OF KORWELD TODAY. You'll find it pays!

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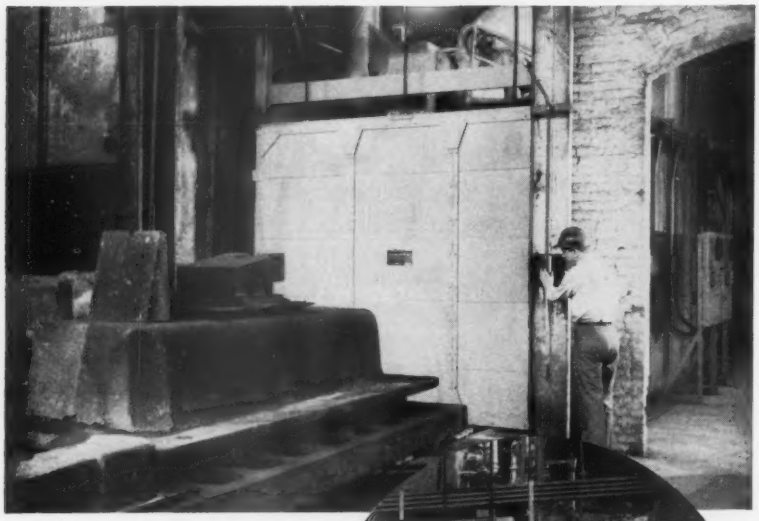
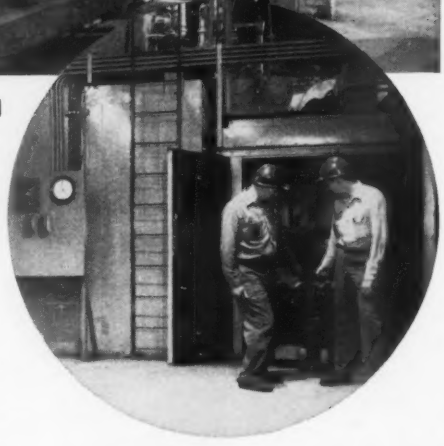


CAR TYPE CORE AND MOLD OVEN

Above—A difficult engineering and installation problem solved by Carl Mayer because the oven filled this space completely. This modern oven, with patented down draft heating system and motor operated lift door, replaced an obsolete brick oven.



RACK TYPE CORE OVEN

Right—Installed at rear of mold oven to form an efficient, flexible combination. Miscellaneous cores are uniformly baked with modern, automatic controls. Operation is efficient and economical.

Carl Mayer's outstanding engineering and design features sold the steel mill where these ovens are now in operation. They incorporate the exclusive Carl Mayer recirculating heating system and special triple slotted panel construction.

Heat loss is reduced up to 1/3, and fuel savings up to 50% over old conventional methods are possible. Temperature uniformity is guaranteed.

Consult Carl Mayer now for any type foundry oven or furnace, large or small, and for any purpose. Write for Bulletin 53-CM.

THE **carl mayer** CORP.

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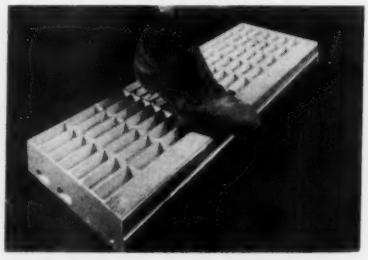
OTHER PRODUCTS: Heat Treating Ovens and Furnaces • Rod Bakers • Welding Rod Ovens • Paint and Ceramic Drying Ovens • Special Processing Equipment and Accessories

are tapped ¼-in. NPT. Made by **Valvair Corp.**, 454 Morgan Ave., Akron 11, O.

For More Details Circle No. 462—Page 196

ALUMINUM STAIR TREAD

Cast aluminum stair tread is designed for industries where stairs are subject to extreme weathering or corrosive atmospheres. Aluminum al-

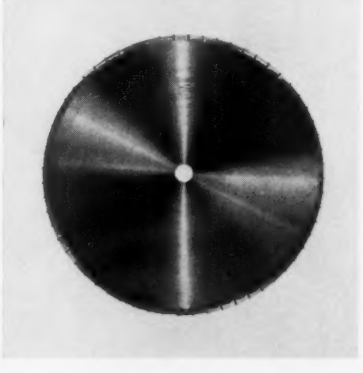


loy insures high corrosion resistance and strength. Dirt will not collect in the rounded, joint-free corners. Sizes range in length from 24 to 42 in. Width is standard at 10 in., but special widths are obtainable. Fillers or spacers are used if length dimensions are not multiples of 6 in. Made by **Aluminum Co. of America**, 1501 Alcoa Bldg., Pittsburgh 19, Pa.

For More Details Circle No. 463—Page 196

GULLETLESS SAW

Gulletless saw, known as a Flying Cutter, has no gullets between its carbide teeth, which are welded into the blade in scientifically determined intervals. The saw reportedly does



not grab material as do standard carbide saws. It can be used effectively for removing gates and risers from nonferrous castings. Made by **Lemmon & Snoap**, Grand Rapids 4, Mich.

For More Details Circle No. 464—Page 196

ROOFING COMPOUND

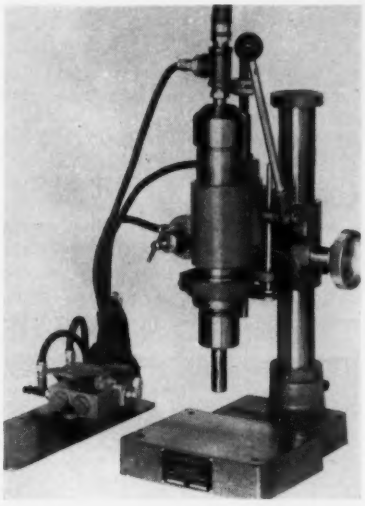
Glasstite, a liquid glass protective roofing compound, is guaranteed to remain watertight for at least 12

years without renewal. The material can be used also for insulating and rust preventive applications. It contains a binder of fiberglass which spreads like a spiderweb when applied. Glasstite is available in 5-gal drums—enough to cover about 200 sq ft—in black or aluminum. Made by **Mallard Mfg. Corp.**, 4th St. & Girard Ave., Philadelphia 23, Pa.

For More Details Circle No. 465—Page 196

AIR HAMMER

Model 200-RH air hammer uses a constant stroke with impact force regulated by varying the air pressure. Valving is internal and is actuated by the tool. In operation, the hammer cylinder is brought down until the tool presses the work. This

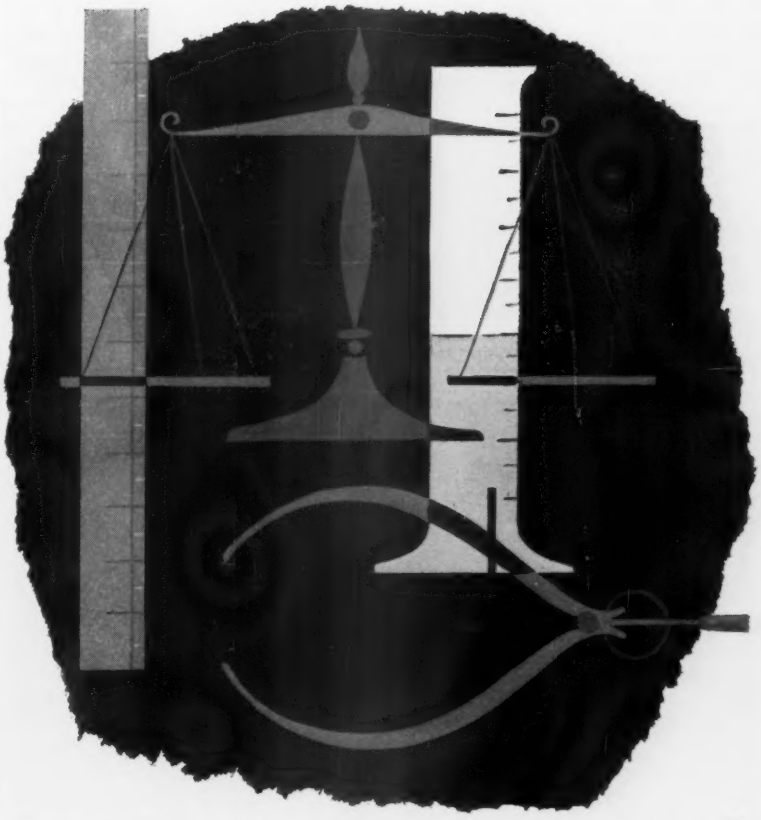


contact pressure opens the hammer valve and as long as the tool is held down the hammer will repeat, striking from 2000 to 4000 times per minute, according to the air pressure used. An air traverse mechanism actuated by a foot valve brings the tool down onto the work and holds it there under uniform pressure during the impact cycle. The machine has a wide range of operations including coining. Made by **Heidrich-Nourse Co.**, 631 East Third St., Los Angeles 13, Calif.

For More Details Circle No. 466—Page 196

PRECISION GAGE BLOCKS

Company has adopted "minus nothing" tolerances for all its standard gage blocks. The new tolerances—plus 8-millionths of an inch, minus nothing, for working accuracy blocks and plus 4-millionths, minus nothing, for inspection accuracy—are said to be the first standard blocks offered with all deviations guaranteed unconditionally to be on the "plus" side



how do you measure economy?

economy is not measured by price alone!

PROVED OVER THE YEARS

When you are concerned with metal abrasives there are many yardsticks that must be applied to truly measure economy.

How long will an abrasive last? How long before it breaks down into fines and becomes inefficient?

How destructive is the abrasive to machinery and equipment?

How efficiently does it perform and what is the time cycle for good performance?

To sum it all up — the economy of using any abrasive can be measured by the **cost per ton of metal cleaned!**

On every count, Malleabrasive has proved its superiority over the years in hundreds of plants.

If you want to improve the economy of your blast cleaning operations — check Malleabrasive.

MALLEABRASIVE®

THE GLOBE STEEL ABRASIVE CO., MANSFIELD, OHIO

1907—Fiftieth Anniversary—1957

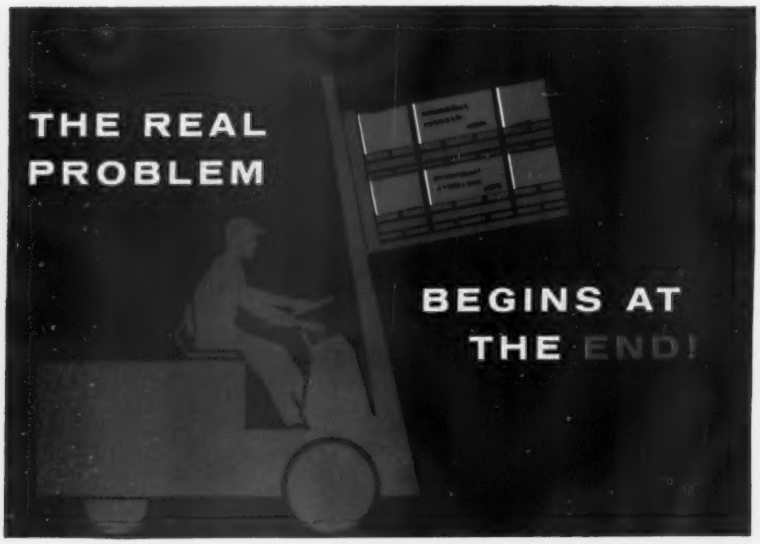
of the nominal block size. Blocks also are claimed to give the user a minimum wear factor which increases the useful life of the blocks. Made by **Ellstrom Standards Division, Dearborn Gage Co.**, 22038 Beech St., Dearborn, Mich.

For More Details Circle No. 467—Page 196

ELECTRIC CHAIN HOIST

Electric chain hoist is adaptable for production lines, over machine tools, or in any location where space is at a premium. Two types of reeving are supplied—a 300-2000-lb capacity, single chain unit and a 3000-4000-lb capacity, double chain unit. Operation has been arranged for one hand control with clearly marked handles for up and down travel of the hook. Double braking action provides built-in double safety. Motors are available for operation on standard voltages and frequencies. Lifting speeds vary with weight being lifted and the available power. Made by **American Chain & Cable Co., Wright Hoist Division**, York, Pa.

For More Details Circle No. 468—Page 196



The problem starts with a blastcleaning operation. It is partially solved when you *buy* a quality shot or grit. The handling of hundreds of pounds of shot and grit can be a costly and bothersome task.

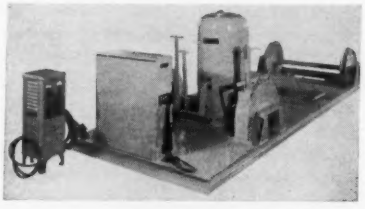
The best way to solve the real problem . . . the whole problem . . . is with Cleveland Metal Abrasive. Through years of service, Cleveland Metal Abrasive Company has gained a reputation for consistently high quality and uniformity. And Cleveland Metal Abrasives are custom-packaged to suit your needs. All shipments of Cleveland Metal Abrasives can be palletized, covered and/or banded.

Non-stop from your receiving dock to anywhere in your plant via lift-truck.

Write for our new catalog today!

The CLEVELAND METAL ABRASIVE Co.
800 East 67th Street, Cleveland 8, Ohio
Howell Works: Howell, Michigan
Toledo Steel Shot Division: Toledo, Ohio

One of the world's largest producers of quality shot and grit—Hardiron—Malleable (Normalized*)—Cast Steel (Realsteel*)
*Copyrighted trade name



TRANSFER CARS

Series of battery-powered transfer cars is designed for heavy-duty industrial applications. They feature pushbutton controls, travel on rails and can be used indoors or outdoors. Cars are self-powered, requiring no trolley or other electrical connections. Other features include two forward speeds and reverse, fingertip control, positive-acting foot and hand brakes, extra-heavy electrical relays, heavy-duty battery, high-torque direct-current motor and a selenium rectifier for battery charging. Made by **Manufacturers Equipment Co.**, 218 Madeira Ave., Dayton 4, O.

For More Details Circle No. 469—Page 196

CORE FILE

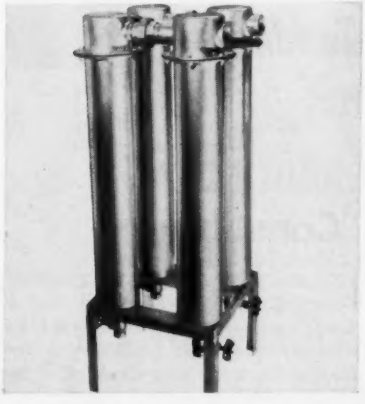
Core file features tooth-like corrugations that provide a filing surface said to reduce physical labor in core cleaning, assure an accurate job, speed the cleaning process and reduce scrap. Number of passes required to clean a core reportedly is reduced from 10 to 3. Sizes from ½-in. square to whatever size is required are available. The heavier the file, the heavier the corrugations. Made by **James H. Gaffney Inc.**, 3420 West 137th St., Cleveland 11, O.

For More Details Circle No. 470—Page 196

WATERLESS AFTERCOOLER

Waterless aftercooler removes oil and water from compressed air lines. Unit consists of four standard air filters connected in series and mounted

to occupy 18 sq in. of floor space. The filter is a 36-in. cylinder, 6 in. in diam, in which is mounted a smaller cylinder having a perforated bottom and filled with Fiberglas. Compressed air enters at the top, flows downward, then up through the Fiberglas whch acts as a series of baffles. The filters in series act as



condensers. The unit eliminates water as a cooling agent. Units are made of 16-gage carbon sheet steel and are tested to 500 lb internal pressure. Made by **Airlenco Inc.,** 143 North Logan St., Elyria, O.

For More Details Circle No. 471—Page 196

HAND CLEANING COMPOUND

Epoxy Remover hand cleaning compound is formulated to remove from the hands materials such as epoxy, polyester and phenolic resins; resin solutions; adhesives; paint and lacquer. The material is similar to cold cream in consistency and contains lanolin for protection of the skin. It contains no strong caustics or scouring abrasives and is rinsed off readily with water. The remover is packaged in 1-lb glass jars packed 12 to a case. Available from **Plaster Supply House,** Box 551, Chicago 90, Ill.

For More Details Circle No. 472—Page 196

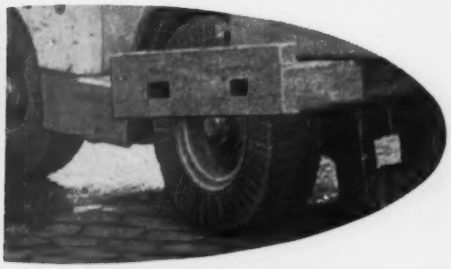
AXIAL AIRFOIL FANS

Axial airfoil fans feature blades with a thick airfoil section and large blade angle at the hub, decreasing to small values at the tip provide high pressure characteristics and reduced operating noise. The hubtip ratios enable a more even delivery of air velocity across the entire fan blade and eliminate back flow that might occur around the hub. Fan diameters run from 12 to 72 in. and have a certified air moving capacity of 1200 to 100,000 cfm. Made by **Chicago Blower Corp.,** 9863 Pacific Ave., Franklin Park, Ill.

For More Details Circle No. 473—Page 196

PROBLEM: HOW TO ELIMINATE "FLATS"— BUT STILL GET A "SOFT" RIDE

SOLUTION: NOTAT TIRES



After a year of use (over cobblestones and steel fragments) this set of Notat Tires still has plenty of wear left.

Granville Strachan, supervisor of Shipping, Receiving and Storage, Samuel M. Langston Co. (Camden, N. J.) corrugated container machinery, reports: "Because our fork trucks travel a great deal over bumpy cobblestone streets, we couldn't use solid tires. And because of steel turnings on the plant floors, we had a lot of "flat" trouble with pneumatic tires. A year has passed since we installed a set of NOTATS on the above Buda. That's longer than most sets of pneumatics ever lasted and we've still got plenty of wear left. We certainly eliminated flats and got the bounce-free riding quality we were looking for." Because NOTAT Tires have no air chamber, they can't go flat. And because they're LAMINATED (not solid) they "give" to prevent damage to loads and vehicles.

NO FLATS WITH NOTATS

NO TUBE AIR TROUBLE

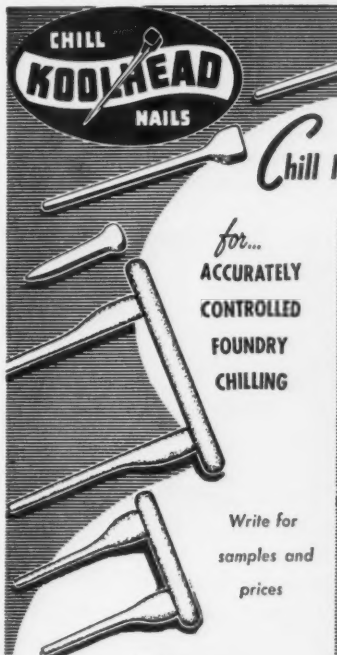
NOTAT TIRE COMPANY
1504 EAST 34th STREET
CHATTANOOGA, TENNESSEE

Circle 686 on Inquiry Card—Page 51

CHILL KOOLHEAD NAILS

Chill Nails and Spiders

for... ACCURATELY CONTROLLED FOUNDRY CHILLING



Write for samples and prices

Choose any style from Jumbo to Stubby; slim, medium or horse nail blade; blunt, pointed, straight or 90° bent. There's a type and size Koolhead Chill Nail or Spider Chill to do your specific chill job best.

You can rely on "KOOLHEAD" and "STANHO" products

STEEL Stanho PRODUCTS

the Quality Line

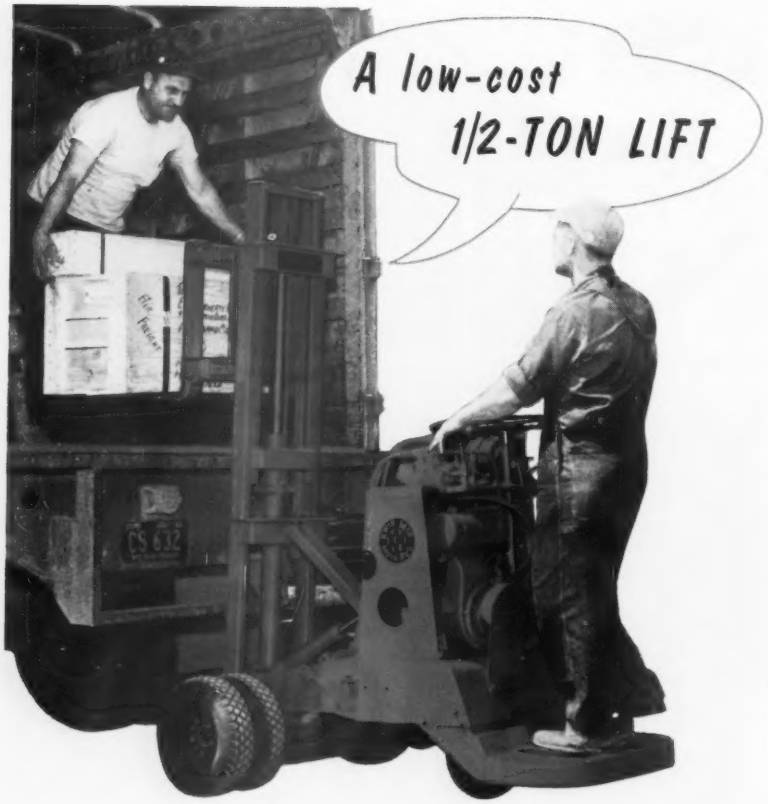
- WOODRUFF KEYS
- MACHINE KEYS
- MACHINE RACK
- TAPER PINS
- COTTER PINS
- SPECIAL PARTS

and other Stanho products Bulk or Packaged

WRITE for CATALOG and PRICES

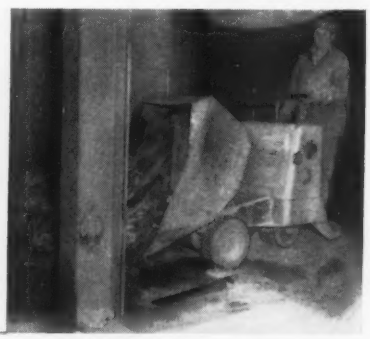
STANDARD HORSE NAIL CORP.
Since 1872
NEW BRIGHTON, PA

Circle 687 on Inquiry Card—Page 51



Low-cost Moto-Bug puts fork lift service within economical reach of small foundries — and has unlimited usefulness as an auxiliary lifting tool in large shops. It handles a lot of light-load work where the cost of operating big, expensive lift trucks is prohibitive. Kwik-Mix S-10 Moto-Bug lifts 1000 pounds (at 15-in. load center) to 6-foot height. Forks are 20 or 30 inches long, adjustable 6 to 32 inches wide. Tilting mast optional. There's full power forward and reverse — safe, automatic "deadman" brakes. Turning radius is only 61 inches — overall width 39 inches.

3-Way usefulness — You can add an interchangeable hopper body, or flatbed platform for hauling loads up to 1500 pounds. This gives extra earnings on your original investment — provides 3-tool usefulness for all kinds of material-handling. Larger-capacity R-15 Moto-Bug with multiple attachments is also available at low cost. See your Kwik-Mix distributor soon — or send for Moto-Bug catalog today.



mail to:

KWIK-MIX COMPANY, Port Washington, Wisconsin

Send literature on S-10 Moto-Bug with: ☐ fork lift ☐ hopper ☐ platform

NAME ..... TITLE .....

COMPANY ..... DIV. .....

STREET .....

CITY ..... STATE .....

☐ Also interested in larger multiple-tool R-15 Moto-Bug KM775 FO

KWIK-MIX MOTO-BUG® (Division of Koehring Co.)

Circle 688 on Inquiry Card—Page 51

Meditations of a Sandman

By HAROLD E. HENDERSON
H. C. Macaulay Foundry Co.
Berkeley, Calif.

"Consultants"

IN these somewhat rambling meditations, I often have wished that it were possible for me to express adequately the deep gratitude I feel toward the many individuals who graciously and generously have shared their time and knowledge with me. Surely they expected nothing in return, for I had nothing to give but a word or two of thanks and a handshake that perhaps indicated something of what I felt.

These men represented all ranks and gradations of the industry, from foundry presidents to apprentice boys and helpers. They were from many lands and of many religions; yet all were inspired by an impelling desire to advance this business of making castings.

To express gratitude for services of an exceptional nature is exceedingly difficult. In some instances, one can, of course, do it with money, to the complete satisfaction of his benefactor. But on other occasions, with other individuals, the offer of money would be as out of place as a jazz band at a funeral.

Then, again, if I were to become too profuse with my superlatives, I would be accused of apple-polishing to obtain further favors. To avoid being so accused, I shall relate a couple of instances, with the names of those concerned omitted, to illustrate the point I have in mind.

In 1946, I journeyed across the continent to attend an AFS convention in Cleveland. At least, that was the ostensible purpose of the jaunt. My real objective was a foundry in Buffalo, where some exceptionally large iron castings were being made in loam. One weighed over 125 tons, clean.

It was not, however, the size of the casting that intrigued me so much as the manner in which it was molded and poured. The entire project was

Lindberg-Fisher manufactures all types of Aluminum Melting and Holding Furnaces for permanent mold application— Gas-Oil- Electric resistance.

Lindberg-Fisher engineers can intelligently recommend the type of furnace to best suit your needs and conditions.

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Sales and service offices in principal cities

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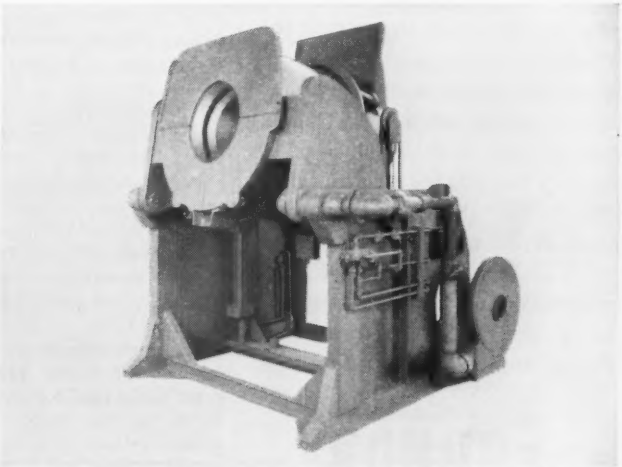
MELTING FURNACES

A Division of Lindberg Engineering Company, 2453 West Hubbard Street, Chicago 12, Illinois

Lindberg-Fisher Electric Resistance Aluminum Melting and Holding Furnace equipped with heavy duty resistance elements which give uniform distribution of heat, insuring long element and pot life. Capacities up to 1000 lbs. Described in Bulletin 320.

Lindberg-Fisher type ADC Aluminum Melting and Holding Furnace. Capacities up to 1000 lbs. of aluminum. Oil or gas fired. Described in Bulletin 301.



Lindberg-Fisher type HNP Hydraulic Nose-Pour Tilting Crucible Furnace. Pouring lip is located in the axis of tilting providing a constant pouring arc regardless of degree of furnace tilt. Capacities up to 1000 lbs. of aluminum. Oil or gas fired. Described in Bulletin 57-A.

Step ahead in this five billion dollar market with

Foundry's

PLUS 5 SERVICE

What is PLUS 5? It's your key to more business from foundries. It gives every FOUNDRY advertiser a bonus he can get from no other source. Here is help in analyzing this market—studying sales territories and potentials—planning the sales effort—and creating a constructive promotion program to the 5 billion dollar foundry market. It's time to take a new look at this market—and at the unusual selling aids we have for you. Say PLUS 5 to your FOUNDRY representative and he'll show you this 5-step program designed to move more of your products into foundries.

A Penton Publication

FOUNDRY

more than a magazine . . . a complete sales development service

Penton Building, Cleveland 13, Ohio

a masterful job of organization, with especial emphasis on the application of scientic methods to the loam process—one that is ancient indeed.

In Buffalo, they still resorted to the use of bricks, mud and the sweep. But I assure you that they were not the materials of Civil War vintage. These bricks were selected with extreme care; the "mud" was a high-quality, synthetic dry-sand facing (Ottawa silica), with a measured and controlled amount of water added; and all sweeps were precisely correct for the job. The wet-blacking produced a finish to be envied.

I was the guest of the foundry superintendent, whom I shall call Sam. He was generous and gracious in explaining to me all phases of his very meticulous operation. He was successfully doing the thing that I had found difficult to believe when reading the articles in our technical press. This visit to Sam's workshop opened a new world of sand meditation for me. With all due respect for the printed word, most of the technical articles were beyond my seventh-grade education, and when I tried to translate a rather nebulous theory into what I facetiously call practice, something was certainly lost in the translation—for invariably I goofed!

Dry Sand Facing Works

If the proof of the pudding is in the eating, Sam certainly knew his pudding—and I liked the taste of it. On returning home, I began to try out (cautiously) some of the advice that Sam had given me. Of course, we didn't go in for loam molding, nor could we afford Ottawa sand, due to prohibitive freight rates. But we did apply some of Sam's methods and mixes in rebonding heaps and in producing a highly satisfactory dry-sand facing, and we've been using it ever since.

Subsequently, I have spent a few hours in night school, and to my surprise I've learned that what Sam patiently explained to me as we toured the plant was precisely what he had written in the technical article that I previously had failed to understand. (I still have a few years before retirement: Maybe I'd better go back to school?)

Another instance also comes to mind. If you've heard it before, don't stop me, for I believe it deserves to be retold. Among my several friends who have earned the title "Foundry Sand Consultant," one in particular has fulfilled the graduation requirements of both college and foundry. He can do a problem in Euclidean geometry, or he can mold

HAVE YOU EVER NOTICED

the numerous types of headings under which classified ads are listed? Whether interested in obtaining qualified personnel, selling used machinery, wanting to buy equipment, or are yourself looking for a better position, you should seriously consider advertising in the classified section of FOUNDRY MAGAZINE.

•

FOUNDRY has 75,000 readers which cover the entire foundry industry. That means that for a nominal sum you get the widest possible coverage of the industry and your advertisement reaches "just the right people".

•

The Classified Staff is equipped to handle all details in the placement of your ad.

CLASSIFIED ADVERTISING DEPT.

FOUNDRY

CLEVELAND 13, OHIO

a cup-saucer-spoon in one piece.

Well, just to avoid embarrassing personalities, we'll call this superman Charlie. (I have thus completely disguised him.) One day, several years ago, Charlie paid his annual visit to the plant that has been feeding me for the past 40 years. After a hearty talk about sand problems in general, I decided to put him to the test by asking him to point out to me at least one glaring instance of poor foundry practice in our plant which could be remedied—inexpensively. (Most of us here are of Scottish descent.)

Charlie took a walk around the shop while the molds were being poured, then came back to me in about an hour with tears running down his cheeks and a bad cough.

He said, "I don't know what you are trying to do on floor No. 15, but any helper who stays on that pouring job will be a casualty in 12 months. You either are using too much oil in those cores, or your oven has failed completely to do its work. Man, those cores are green, and they're sending off gas that nearly strangled me! Are you able to sell the castings?"

As a matter of fact, there were too many that we couldn't sell. Acting on Charlie's suggestion, we reduced the core oil in our mix by almost 50 per cent and still retained plenty of strength and hardness. We adjusted the heating elements in our ovens and cleaned the flues. As a result, we reduced cost and loss in one fell swoop. For probably the first time in our history we became conscious of the need for *thorough baking*.

Have I made myself clear? What do I owe to these men, whose advice has proved so profitable? How do you thank a man for saving your life? When we boast of knowledge achieved and practice improved, do we ever pause to give a modicum of credit to the teacher?

Explains Suggestion Plans

"Suggestion Plan Guide," a booklet recently published by the Society for Advancement of Management, is a 24-page research report of the Reading, Pa., chapter of the society. It is designed to explain in manual form the most successful policies and procedures used by American industry to install and administer an employee suggestion system. Copies are available for $1.50 each from the Society for Advancement of Management, 74 Fifth Ave., New York 11, N. Y.

Off-the-Shelf

AT YOUR

WHITEHEAD

FOUNDRY ALLOY

"Supermarket"

YOUR HANDFULS TO CARLOAD requirements of Silicon as well as the other principal foundry alloys, are off-the-shelf out of stock from your nearest Whitehead Warehouse. We handle the principal foundry alloys of Vanadium Corporation of America and the International Nickel Corp. They're priced right, too. And, you have your choice of all standard sizes and forms.

Though we call ourselves the "Foundry Alloy Supermarket" we do offer personal service. . . . Our foundry engineers will be happy to answer any questions you may have, or otherwise work with you in any way they can.

For a thorough description of forms, analyses, and uses of more than 30 stock ferro alloys write for bulletin FAI.

WHITEHEAD METAL PRODUCTS COMPANY, INC.

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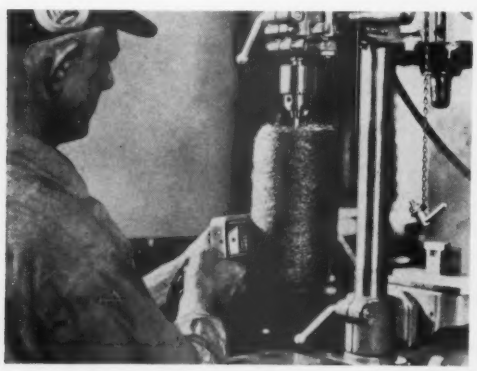
Very small castings are deburred and polished on a disc sander mounted horizontally in a special rack

Three-leg spider base makes it easy to drill holes in large, awkward castings such as bathtubs

Variety of Work Handled by

STANDARD POWER TOOLS

VERSATILITY of standard power tools makes them ideally suited for foundry work. They provide rugged, dependable service plus portability. A sander for example, can be used in the pattern shop today

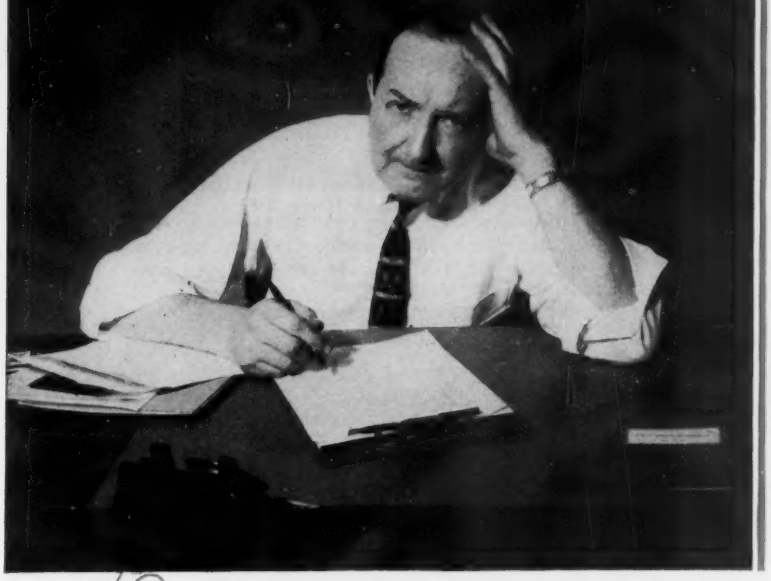


Die castings are given fine finish with steel wool on mandrel held in a drill press spindle

Back spotfacing machine is made from a drill press which is mounted upside down

For Real Help

in making cold setting binder work



Call G. E. SMITH, INC. for "in-plant" engineering assistance.

EXCLUSIVE MANUFACTURERS OF THE ORIGINAL ®

KOLD-SET

COLD SETTING BINDER

Many foundries are reaping cost savings of as much as 65% with the Kold-Set cold setting binder process. Two facts account for this...

Kold-Set is a *proved* cold setting binder. Moreover, in introducing this totally new concept of core and mold making, G. E. Smith foundry specialists learned very early that the cold setting binder process cannot simply be used. It must be engineered . . . adapted to each foundry's individual method of operation. This requires specialized training and experience.

G. E. Smith engineers have the training and experience necessary to come into your plant and make the Kold-Set process work . . . to adapt it to your operation for best results . . . consistently.

So, if you want real help, call G. E. Smith now! Once installed, the Kold-Set process means cost savings in your overall operation.

FOR FULL TECHNICAL DATA...

Write for Technical Bulletins 2 and 3 for the complete story on the Kold-Set process and how it can drastically reduce costs.

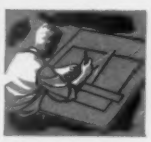
KOLD-SET

COLD SETTING BINDER

ADVANTAGES

Laboratory Control

Only finest ingredients, in full measure are used to make Kold-Set Binder and Activator. Completely uniform manufacture, governed by scientifically controlled laboratory procedure makes Kold-Set consistent in quality . . . the unrivaled best cold-setting binder.



Engineering "Know-how"

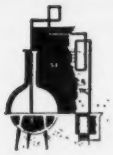
G. E. Smith engineers have the broad background of foundry experience necessary to apply Kold-Set to core and mold making problems intelligently. They are backed up with a thoroughly qualified, service-minded engineering and research organization.

On the job Assistance

G. E. Smith service includes "in-plant" assistance in setting up the best method for making cores and molds with the equipment available. Engineers are qualified and equipped to recommend methods to achieve optimum results with Kold-Set at a minimum of expense.

Proved Performance

The Kold-Set process not only greatly speeds core and mold making. It has been proved in plant after plant to produce uniform, more accurate cores and molds with excellent surface and dimensional stability. It produces better castings at lower overall cost.

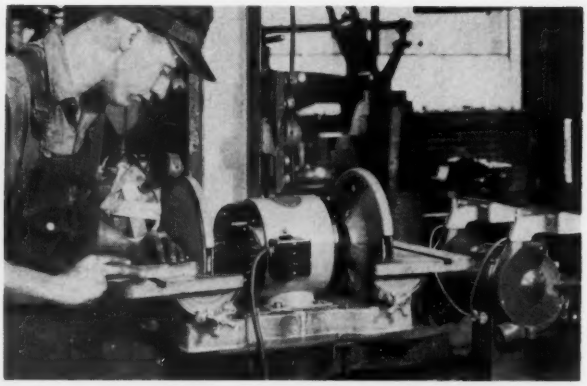


G. E. SMITH, INC.

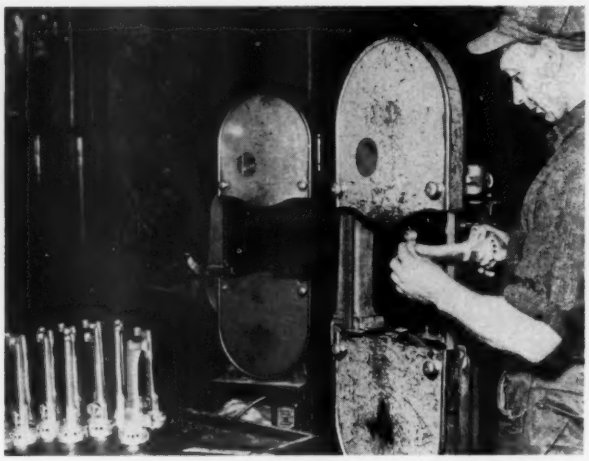
246 WASHINGTON ROAD PITTSBURGH 16, PA.

ORIGINAL AND EXCLUSIVE MANUFACTURERS OF THE KOLD-SET PROCESS IN THE UNITED STATES.

Band saw is used to remove gates and risers quickly and smoothly; minimizes further finishing



Castings are ground coarse and fine on a disc sander. Two disc finishing machines welded together form one unit, and both discs are driven by one motor



Abrasive belt in 14-in. band saw is used to polish and deburr intricate aluminum castings rapidly

and for deburring work tomorrow. A drill press can be used for finishing or for drilling in an infinite number of setups.

Often, modification of a standard power tool makes it more useful for finishing operations. An abrasive belt in a band saw and steel wool on a drill press spindle are two such applications illustrated in the accompanying pictures.

Low cost of power tools makes it practical to spot them at strategic points throughout the production area for deburring and finishing operations. Band saws and sanders used in combination provide complete finishing on many castings at one work station. Elimination of extra handling adds up to significant savings.

Accompanying illustrations are by courtesy of Delta Power Tool Division, Rockwell Mfg. Co.

Form National Production and Inventory Control Society

The American Production and Inventory Control Society has been formed to serve the specialized needs of industrial executives directly responsible for production control and inventory control activities.

Principal objectives of the groups were outlined recently in Cleveland and temporary officers were elected to serve during an interim period while a constitution and by-laws are drawn up and the society's permanent structure is outlined.

Temporary officers are: President, M. W. Maddox, Mueller Brass Co., Port Huron, Mich.; vice president, R. E. Carruth, Acushnet Process Co., New Bedford, Mass.; secretary, Don Burkhart, Haynes Stellite Corp., Kokomo, Ind., and treasurer, Louis Norheimer, Tube-Turns Inc., Louisville. Each of these men is a production control manager in his respective organization.

Booklet Discusses Chemistry And Metallurgy of Copper

"Structural Chemistry and Metallurgy of Copper" by Dr. D. K. Crampton discusses some of the work on recrystallization and grain growth of copper alloys, investigating time intervals much shorter than used previously.

The structural chemistry of copper and copper alloys, particularly in relaxation of grains and grain boundaries both in pure copper and in some copper alloys, new investigations of the fundamentals of corrosion and corrosion resistance of copper, and some factors affecting incidence of corrosion pits also are covered.

The paper was presented as the fifth H. W. Gillett Memorial Lecture at the 1956 annual meeting of the American Society for Testing Materials. Copies may be obtained for $1.50 from the society, 1916 Race St., Philadelphia 3, Pa.

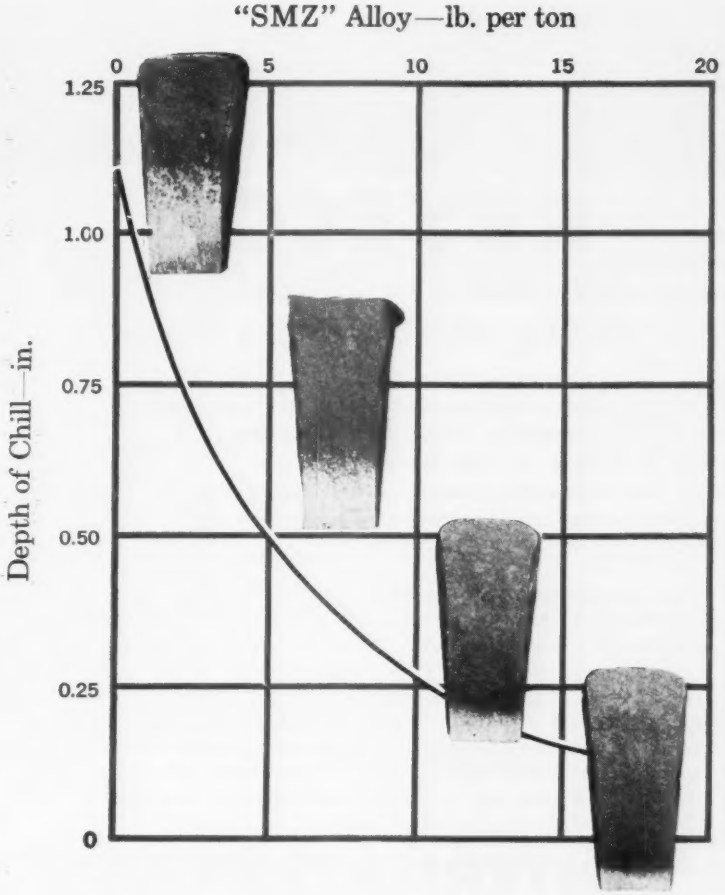
IMPROVE MACHINABILITY OF GRAY IRON

...eliminate hard spots with SMZ alloy

The chill blocks at the right clearly show how the chilling properties of gray iron are sharply reduced by small ladle additions of SMZ alloy, a strong graphitizing inoculant containing silicon, manganese, and zirconium. The blocks were poured from a 3.15 per cent carbon, 1.80 per cent silicon iron. Additions of 5, 8, and 16 pounds of SMZ alloy per ton (0.15, 0.25, and 0.50 per cent silicon) progressively reduced the chill depth from 1.09 in. for the untreated iron to 0.19 in. for the iron which received the heaviest addition.

The exceptional ability of SMZ alloy to eliminate chill in corners and thin sections vastly improves the machinability of iron. Foundries have reported that inoculating iron with SMZ alloy increases the machining rate by as much as 25 per cent. As little as 2 to 4 pounds of the inoculant are sufficient to eliminate hard corners and edges in light castings. For harder irons of low carbon and silicon contents a larger addition of the alloy may be required.

Write or phone your nearest ELECTROMET office for more information on this important ladle-addition alloy. Ask for the booklet, SMZ Alloy—An Inoculant for Cast Iron. An ELECTROMET representative will also be glad to give you all the technical details. ELECTROMET METALLURGICAL COMPANY, Division of Union Carbide Corporation, 30 E. 42nd Street, New York 17, N. Y. *Offices:* Birmingham, Chicago, Cleveland, Detroit, Houston, Los Angeles, Phillipsburg, N.J., and San Francisco. *In Canada:* Electro Metallurgical Company, Division of Union Carbide Canada Limited, Toronto.



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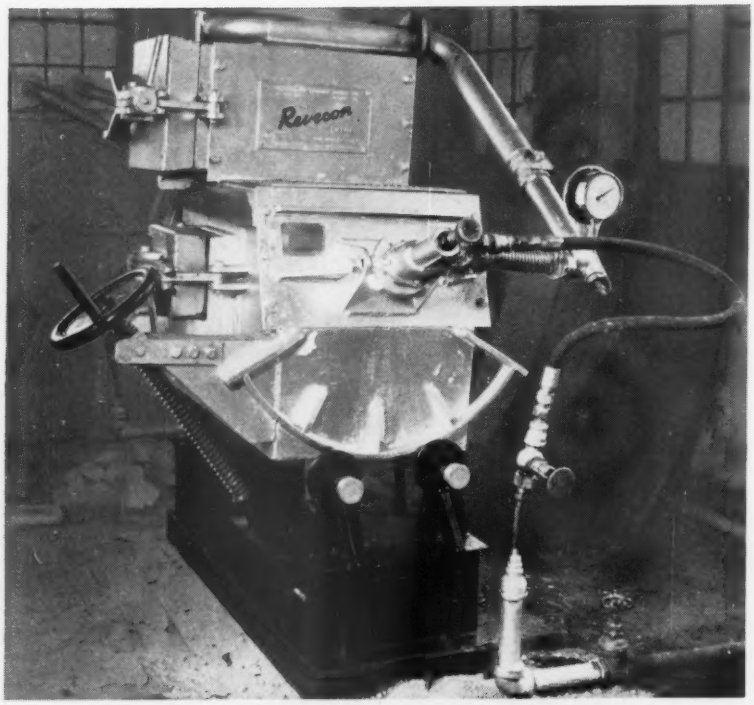

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Here's a melting furnace that can revolutionize your entire operation! Either gas or oil fired, this one-man unit can melt any metal except steel with capacities from 50 lbs. to 5 tons. Sample melt speeds: 100 lbs. aluminum — 10 min.; 100 lbs. brass — 15 min.; 100 lbs. iron — 45 min. Build this kind of melting speed into your operation with REVECON. Like to see it operate? Write, wire or phone today for an appointment to test the REVECON in our demonstration plant. Use your own metal if you like, but see it now and learn how REVECON makes crucible melting old-fashioned and costly!

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Canadian Representatives: Drew Brown Ltd.
5410 Ferrier Street, Montreal 9

Distinguishing Between Quotations and Offers

Quotations Bind Seller To Fulfill the Contract

By Alfred W. Gray

IN a decision by an English court more than 50 years ago, the distinction, since adopted by the courts of this country, was made between a quotation that is merely an invitation to trade and an offer that becomes a binding and enforceable contract upon acceptance.

In the London *Pall Mall Gazette* on December 13, 1891, this advertisement appeared: "100£ reward will be paid by the Carbolic Smoke Ball Company to any person who contracts the increasing epidemic influenza, colds or any disease caused by taking cold after having used this ball three times daily for two weeks according to the printed directions supplied with each ball."

On the faith in this advertisement a woman bought this carbolic smoke ball, used it for nine weeks, contracted influenza and sued for the advertised 100£. In its decision, the English court awarded the purchaser of this influenza remedy the 100£ offered in the advertisement. In its summary of the law in that decision, the court outlined the essence of this distinction between quotations and offers that, as in this instance, become binding upon acceptance. Of this advertisement it said:

"It is not like cases in which you offer to negotiate or you issue advertisements that we have got a stock of books to sell or houses to let, in which case there is no offer to be bound by any contract. Such advertisements are offers to negotiate—offers to receive offers—offers to chaffer, as I think some learned judge in one of the cases has said. If this is an offer to be bound then it is a contract the moment the person fulfills the condition."

Resting his statement of the law on this decision as an authority, Prof. Samuel Williston of Harvard University has said, "Frequently negotiations for a contract are begun between parties by a general expression of willingness to enter into and bargain upon stated terms and yet the natural construction of the words and conduct of the parties is rather that they are inviting offers or suggesting the terms of a possible future advertisement.

"Thus if goods are advertised for sale at a certain price, it is not an offer and no contract is formed by

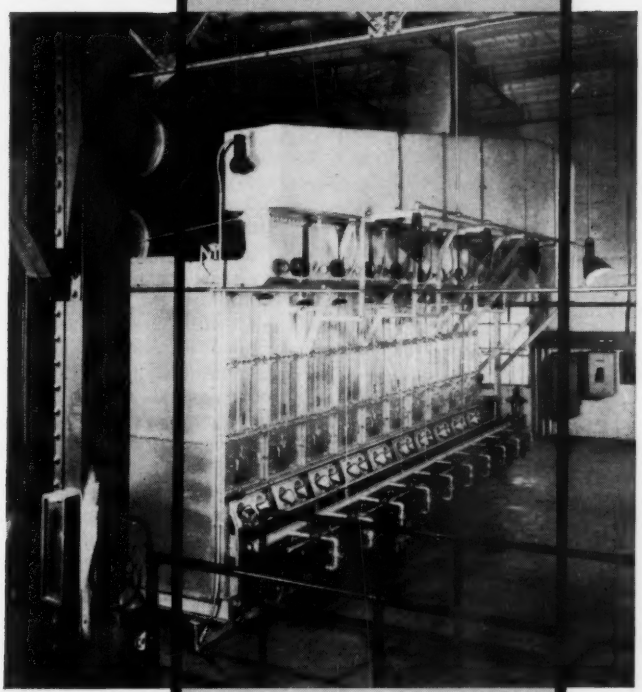
ROSS

Air Systems

Engineered Atmospheres for Better Processing

ROSS HOT BLAST SYSTEM

- *an efficient way to heat cupola air*
- *a simple way to get this hot air to the cupola*



How hot would you want the air going to the cupola? 500 degrees? 1000 degrees?

The ROSS Hot Blast System can deliver hot air in any volume required up to about 1000°F. It is designed with two major variations: (1) for heating the air up to 500°F. and (2) up to 1000°F. Either unit can be tied into your present operations without stopping production. Existing blowers, if correctly rated, can be used.

You know the production advantages in being able to deliver to the cupola air preheated to the correct temperature — and held at that temperature — in the required volume. We suggest you ask to have a Ross Engineer study your cupola layout and outline probable savings if you change over to the Ross System.

ROSS CORE OVENS

While the Hot Blast System makes use of air and there is definitely a conditioning and control problem involved, it is with the CORE OVEN that skill in designing and creating the 'engineered atmosphere' is the major factor. For, Curing Ovens, to be most efficient, must coordinate temperature, air volume and air movement so as not only to provide uniform temperature conditions throughout the oven but to keep temperature drop to a minimum. Only uniformly baked cores can assure maximum production of castings. Wide temperature variations are bad.

THE ROSS GROUP OF COMPLEMENTING SERVICES

J. O. Ross Engineering Corporation, New York
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John Waldron Corporation, New Brunswick, N. J.

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Circle 695 on Inquiry Card—Page 51

GOT MELTING PROBLEMS?

Solutions to gray iron foundry problems often come easier to outside consultants. To get expert help, call a Semet-Solvay metallurgist . . . he's a practical foundryman whose job it is to help you.

The high uniform quality of Semet-Solvay Foundry Coke plus expert help from our metallurgist will solve your cupola problems.

SEMET-SOLVAY DIVISION
Allied Chemical & Dye Corporation

40 Rector Street — *New York 6, N. Y.*
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Western Distributor: WILSON & GEO. MEYER & CO., San Francisco

For Better Melting

Circle 696 on Inquiry Card—Page 51

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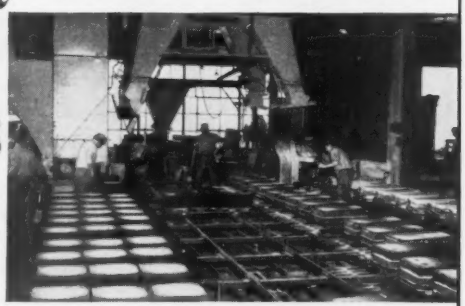
NOMAD
CONVEYOR RAILS
mean
- MORE PRODUCTIVITY
- GREATER EFFICIENCY
- BIG SAVINGS



When you use **NOMAD** Rails the molds are set on a pallet, sent down the conveyor line and poured. This modern procedure marks the tremendous improvement between the old "running out" and the new "rolling away" of molds. The work area is kept clear. There is added time for increased production. And, shake-out and sand preparation can be handled with existing equipment. The whole Nomad process is *easier*. That's all there is to it!

Write for information that will put your foundry on a new competitive basis.

NOMAD
FOUNDRY EQUIPMENT

WESTOVER CORPORATION
NOMAD EQUIPMENT DIVISION
3110 W. FOND DU LAC AVE. • MILWAUKEE 10, WIS.

Circle 697 on Inquiry Card—Page 51

the statement of an intending purchaser that he will take a specified quantity of goods at that price. The construction is rather favored that such an advertisement is a mere invitation to enter into a bargain rather than an offer. So a published price list is not an offer to sell the goods listed at the published price."

This distinction between these two features in the sales law was a determining factor in a controversy before the Iowa Supreme Court. In a letter from a buyer, information was asked about prices for immediate shipment, to which the seller replied, "We can quote you $1.75 for Illinois and Indiana delivery. We have a good supply of these commodities and would be very glad to open some business with your company."

On the following day the customer wired, "Enter our order ten cars one seven five. Wire when can ship." Four days later the seller wrote expressing its regret that it did not have a sufficient stock to fill an order for this amount. Suit was brought by this customer claiming damages for a breach of contract in failing to deliver.

The Iowa court in sustaining a verdict denying the right of this customer to recover, said, "The first letter discloses simply a request for quotation of prices. This request was complied with. The customer thereupon assumed to order a definite quantity of the articles held for sale in conformity with its prices as evidenced by the sales sheets.

"There is nothing to show that the dealer ever agreed to sell this customer any definite number at the price fixed in its sales sheets. The most that can be argued on this proposition is that the dealer said it had a good supply of these commodities."

In a case before a Wisconsin court

"It isn't often we can afford a new conveyor you know."

for review nearly three quarters of a century ago, a decision was rendered that since has been held by the courts as an authority in distinguishing between a mere quotation and an offer that requires but an acceptance to become an enforceable contract.

In a letter this dealer wrote to a customer offering its product "In full carload lots of 80 to 95 bbls. at 85c per bbl.," to which the customer replied, "You may ship 2000 barrels as offered." When the seller refused to deliver this merchandise, suit was brought by the buyer for what it claimed was a breach of contract.

In holding that the seller supplying these quotations was free of any liability for a breach of contract, the Wisconsin court said, "We however place our opinion on the language of the letter and hold that it cannot be fairly construed into an offer to sell to the purchaser any quantity he might order nor any reasonable amount he might see fit to order.

"They did not say, 'We offer to sell you.' They use general language proper to be addressed generally to those interested in the trade. It is clearly in the nature of an advertisement or business circular to attract the attention of those interested in that business to the fact that good bargains could be had by applying to them and not an offer by which they were to be bound, if accepted. for any amount the persons to whom it was addressed might see fit to order."

Book on Deoxidation of Steel Honors Charles H. Herty Jr.

Publication of a memorial volume of some of the published papers of the late Dr. Charles H. Herty Jr. on "Deoxidation of Steel" has been announced by the Metallurgical Society of the American Institute of Mining, Metallurgical and Petroleum Engineers.

The 700-page volume is obtainable from AIME at its headquarters, 29 West 39th St., New York 18, N. Y. Price is $10 for nonmembers and $7 for members.

Dr. Herty is known for his many contributions to the art of steelmaking. He was a president of the American Society for Metals, received the Sauveur Achievement Award and was a Campbell Memorial Lecturer. AIME honored him as Hunt Medallist and Howe Memorial Lecturer. He also received the F. J. Clamer Medal from the Technical Society of Philadelphia and the Bradley Stoughton Award at Lehigh University. Dr. Herty died in 1953.

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ARE SPECIALLY RECOMMENDED
Threaded Stems 20 ga. to 1/4" Dia. 3/16" to 1" High
Sharp Threads for Fast "Knitting-In"
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Foundry Statistics

ALUMINUM

(Shipments of castings—1000 pounds[1])

	Shipments				Unfilled Orders[2]
	Total	Sand	Perm. Mold	Die	
1955	827,162	165,482	298,349	355,203	.....
1956					
Mar.	73,785	16,597	22,816	33,965	110,642
3 mo.	221,033	48,018	71,307	100,167	.....
Apr.	67,880	14,732	20,718	31,782	106,477
May	65,786	15,570	19,699	29,814	102,121
June	58,189	13,448	19,067	25,027	102,068
July	52,955	12,398	16,388	23,491	106,620
Aug.	61,407	13,100	18,067	29,553	109,352
Sept.	62,503	12,354	17,855	31,640	111,785
Oct.	74,209	14,389	21,120	37,782	110,818
Nov.	69,741	14,333	20,673	33,929	113,356
Dec.	67,333	13,391	20,557	32,931	118,185
Total	801,036	171,733	245,451	376,116	.....
1957					
Jan.	72,999	14,201	20,963	37,194	116,088
Feb.	69,451	13,366	21,707	34,311	107,869
Mar.	74,527	13,914	22,974	37,521	107,963
3 mo.	216,977	41,481	65,644	109,026	.....

MALLEABLE IRON

(Shipments of castings—net tons[1])

	Shipments		Standard		Pearlitic		Unfilled Orders[2]
	Total	For Sale	Total	For Sale	Total	For Sale	
1955	1,104,775	652,552	.....	.....	.....	.....	.....
1956							
Mar.	86,941	46,266	75,384	40,869	11,557	5,397	106,491
3 mo.	274,036	155,350	235,391	134,222	38,645	21,128	.....
Apr.	83,320	47,064	72,763	41,449	10,557	5,615	99,573
May	80,138	51,053	69,593	44,424	10,545	6,629	93,677
June	75,635	45,022	66,300	26,791	9,335	5,513	86,247
July	54,340	31,300	45,977	26,881	8,363	4,419	92,078
Aug.	74,422	43,479	62,867	36,759	11,555	6,720	91,883
Sept.	69,380	41,902	59,071	35,534	10,309	6,368	92,553
Oct.	81,528	50,219	68,769	43,109	12,759	7,110	92,734
Nov.	82,717	47,979	68,549	40,107	14,168	7,872	89,977
Dec.	76,352	44,268	63,625	37,569	12,727	6,699	92,311
Total	951,868	557,636	812,905	466,845	138,963	78,073	.....
1957							
Jan.	85,977	51,508	71,689	43,401	14,288	8,107	93,886
Feb.	78,028	46,729	65,411	39,590	12,617	7,139	90,725
Mar.	78,013	48,311	64,560	23,915	13,453	7,666	89,431
3 mo.	242,018	146,548	201,660	106,906	40,358	22,912	.....

COPPER-BASE ALLOY

(Shipments of castings—1000 pounds[1])

	Shipments			Unfilled Orders[2]
	Total	Sand	Perm. Mold	
1955	1,008,898	905,867	63,111	.....
1956				
Mar.	96,085	85,094	6,299	65,560
3 mo.	277,558	247,454	18,322	.....
Apr.	90,679	81,333	5,835	68,106
May	89,188	80,105	5,448	58,789
June	78,921	70,260	5,052	55,019
July	60,926	55,027	3,193	59,661
Aug.	77,619	70,479	3,805	56,364
Sept.	72,109	64,887	3,930	56,990
Oct.	81,049	73,058	4,104	54,363
Nov.	72,866	65,022	4,114	52,643
Dec.	65,198	57,929	3,769	56,556
Total	966,113	865,554	57,572	.....
1957				
Jan.	82,025	73,202	4,510	57,422
Feb.	72,084	64,346	4,188	54,133
Mar.	77,418	69,258	4,445	49,135
3 mo.	231,527	206,806	13,143	.....

MAGNESIUM

(Shipments of castings—1000 pounds[1])

	Shipments		Unfilled Orders[2]
	Total	For Sale	
1955	27,854	25,294	....
1956			
Mar.	3,046	2,842	6,411
3 mo.	8,982	8,162	.....
Apr.	3,140	2,949	7,137
May	3,021	2,801	7,293
June	2,949	2,765	7,850
July	2,810	2,666	7,937
Aug.	3,079	2,860	8,201
Sept.	3,079	2,863	8,193
Oct.	3,442	3,187	7,893
Nov.	2,892	2,715	7,984
Dec.	2,794	2,612	7,616
Total	36,168	33,580	....
1957			
Jan.	3,207	3,017	8,245
Feb.	2,661	2,473	8,276
Mar.	2,970	2,804	7,690
3 mo.	8,838	8,294	....

PRODUCTION WORKERS

Estimated Number

	Feb. 1957	Jan. 1957	Feb. 1956
Ferrous	203,100	205,700	215,700
Nonferrous	65,600	67,300	66,000

Average Weekly Earnings

Gray Iron	83.46	84.99	83.23
Malleable Iron	85.39	86.24	84.26
Steel	98.37	98.18	94.16
Nonferrous	90.72	91.13	87.10

Average Weekly Hours

Gray Iron	39.0	39.9	41.0
Malleable Iron	39.9	40.3	41.1
Steel	42.4	42.5	42.8
Nonferrous	40.5	40.5	40.7

Source: Bureau of Labor Statistics

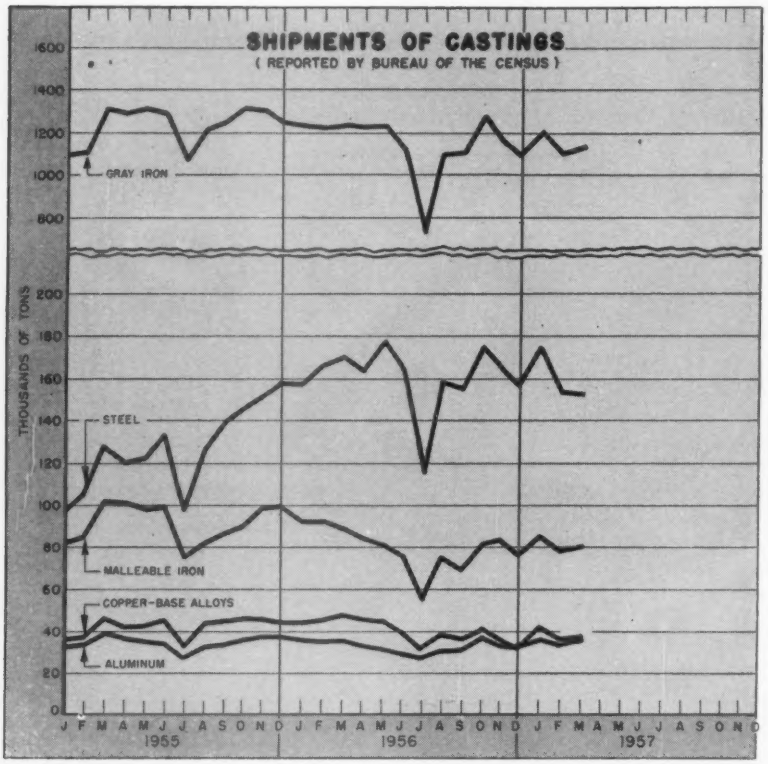
GRAY IRON CASTINGS—SHIPMENTS (Net Tons[1])

	All Castings		Miscellaneous Castings		Heavy Steel Ingot Molds		Chilled Railroad Car Wheels	Pressure Pipe & Fittings	Soil Pipe & Fittings	Unfilled Orders[2]
	Total	For Sale	Total	For Sale	Total	For Sale	Total	Total[3]	Total[3]	
1955	14,837,745	7,987,205	9,161,685	3,715,963	2,739,864	1,392,209	385,041	1,681,630	869,558	.....
1956										
Mar.	1,275,405	715,173	752,498	331,749	254,045	139,625	42,676	132,384	73,802	1,162,578
3 mo.	3,719,692	2,072,684	2,262,110	980,974	753,402	400,849	110,158	396,984	197,038	.....
Apr.	1,218,000	702,145	719,109	314,968	237,486	130,473	39,325	151,670	70,410	1,144,870
May	1,235,631	737,081	702,834	321,413	243,719	131,294	38,415	171,859	78,800	1,086,122
June	1,152,156	686,896	656,778	298,578	217,135	102,405	34,028	170,122	74,093	1,041,315
July	762,611	487,736	509,702	241,771	9,556	7,093	32,484	144,964	65,905	1,109,069
Aug.	1,103,195	671,523	639,953	293,673	170,857	89,589	31,712	180,249	80,424	1,074,461
Sept.	1,109,943	648,784	623,743	282,824	233,823	117,708	35,361	151,081	65,935	1,037,283
Oct.	1,274,734	734,384	749,200	331,069	252,203	134,265	30,978	171,377	70,976	996,351
Nov.	1,175,572	634,856	720,263	303,938	251,262	131,321	27,852	116,157	60,038	916,723
Dec.	1,108,993	587,046	681,834	281,527	254,703	136,584	25,874	92,439	54,143	920,034
Total	13,860,527	7,963,135	8,265,526	3,650,735	2,624,146	1,381,490	406,191	1,746,902	817,762	.....
1957										
Jan.	1,213,215	642,317	761,697	320,058	261,961	136,456	31,139	101,069	57,346	904,860
Feb.	1,103,118	582,010	705,585	302,514	230,126	115,525	30,079	89,146	48,182	931,054
Mar.	1,133,146	604,481	713,767	305,104	214,775	98,694	36,995	108,158	59,451	934,847
3 mo.	3,449,479	1,828,808	2,181,049	927,676	706,862	350,675	98,213	298,373	164,979	.....

STEEL CASTINGS—SHIPMENTS (Net Tons[1])

	All Castings			Carbon			Alloy			Unfilled Orders[2]
	Total	For Sale	Railway Specialties	Total	For Sale	Railway Specialties	Total	For Sale	Railway Specialties	
1955	1,530,694	1,166,706	236,880	1,088,489	814,258	219,602	445,769	354,452	17,278	.....
1956										
Mar.	170,045	130,839	31,991	126,783	95,779	29,953	43,462	35,060	2,038	594,990
3 mo.	494,061	382,780	90,778	365,954	279,257	85,427	128,107	103,523	5,351	.....
Apr.	163,708	125,015	27,475	121,723	91,332	25,302	41,985	33,683	2,173	600,242
May	178,227	142,025	35,949	134,919	107,575	33,695	43,308	34,450	2,254	608,275
June	164,661	129,147	31,296	122,483	95,621	28,801	42,178	33,526	2,495	597,103
July	117,984	96,350	19,833	88,971	72,837	18,545	29,013	23,513	1,288	611,233
Aug.	159,831	127,001	32,965	119,025	94,257	30,601	40,806	32,744	2,364	586,496
Sept.	155,046	121,705	33,496	116,905	91,266	31,314	38,141	30,439	2,182	562,937
Oct.	175,630	135,798	34,762	132,250	101,961	32,743	43,380	33,837	2,019	558,478
Nov.	164,114	126,900	28,284	122,212	93,262	26,436	41,902	33,638	1,848	545,862
Dec.	158,725	125,569	34,080	120,326	94,741	32,227	38,399	30,828	1,853	521,782
Total	1,931,987	1,512,290	368,918	1,444,768	1,122,109	345,091	487,219	390,181	23,827	.....
1957										
Jan.	169,240	133,826	30,090	125,389	98,533	27,739	43,851	35,293	2,351	519,575
Feb.	154,932	121,667	27,181	114,805	89,480	25,060	40,127	32,187	2,121	511,806
Mar.	160,054	124,416	29,968	121,089	93,466	27,683	38,965	30,950	2,285	503,407
3 mo.	484,226	379,909	87,239	361,283	281,479	80,482	122,943	98,430	6,757	.....

[1]Source: Bureau of Census. [2]For sale only. [3]All cast iron pipe is shipped for sale.


SHIPMENTS OF CASTINGS
(REPORTED BY BUREAU OF THE CENSUS)
THOUSANDS OF TONS
GRAY IRON
STEEL
MALLEABLE IRON
COPPER-BASE ALLOYS
ALUMINUM
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1955
1956
1957

COKE PRODUCTION AND CONSUMPTION

(Net tons*)

	Production	Consumption Total	Consumption By Foundries
1955 ...	75,150,247	76,266,385	3,154,052
1956			
Mar. ...	6,896,593	6,861,698	267,414
3 mo..	20,287,564	19,550,446	804,023
Apr. ...	6,633,363	6,572,836	247,664
May ...	6,725,396	6,587,030	241,558
June ...	6,235,691	6,163,668	214,484
July ...	2,301,442	1,596,570	193,431
Aug. ...	5,614,997	5,281,627	225,978
Sept. ...	6,453,229	6,609,309	211,015
Oct. ...	6,742,483	6,951,386	253,147
Nov. ...	6,328,272	6,681,074	237,330
Dec. ...	6,615,935	6,959,900	224,452
Total .	73,938,372	72,953,846	2,853,082
1957			
Jan. ...	6,857,640	7,096,024	241,014
Feb. ...	6,211,845	6,302,583	228,569
Mar. ...	6,895,073	6,799,584	233,069
3 mo..	19,964,558	20,198,191	702,652

INGOT BRASS AND BRONZE

(Shipments in net tons)

	1956	1957
Jan.	27,736	25,681
Feb.	24,949	20,769
Mar.	28,310	21,948
Apr.	25,808	23,507
May	23,437	.....
June	18,842	.....
July	17,364	.....
Aug.	23,812	.....
Sept.	20,929	.....
Oct.	23,045	.....
Nov.	21,818	.....
Dec.	18,046	.....
Total for year	274,096	.....

Source: Defense Council of the Ingot Brass and Bronze Industry.

ZINC-BASE ALLOY

(Shipments of castings—1000 pounds[1])

	Shipments Total	Shipments For Sale	Unfilled Orders[2]
1955	778,000	493,244	.....
1956			
Mar.	65,760	42,806	73,025
3 mo. ..	200,664	128,856	.....
Apr.	58,274	37,518	71,730
May	52,205	33,920	60,634
June	47,775	31,983	61,809
July	42,227	27,301	64,806
Aug.	52,321	33,281	73,411
Sept.	46,340	33,967	79,390
Oct.	65,450	41,943	75,706
Nov.	64,972	39,718	74,623
Dec.	58,111	36,090	75,293
Total ...	688,339	444,577	.....
1957			
Jan.	67,964	42,189	75,503
Feb.	59,793	36,580	74,739
Mar.	61,378	40,593	64,466
3 mo. ..	189,135	119,362	.....

INDEX OF FOUNDRY EQUIPMENT ORDERS

Foundry Trades Only

(Net Orders Closed, New Equipment)

	1956	1957
Jan.	195.6	117.9
Feb.	169.0	188.4
Mar.	152.7	127.0
Apr.	135.2	....
May	207.0	....
June	156.7	....
July	110.3	....
Aug.	188.3	....
Sept.	114.7	....
Oct.	122.2	....
Nov.	121.0	....
Dec.	115.6	....

Note: Figures are percentages of the base period 1947-49 taken as 100 per cent monthly average. This is a new base period. Source: Foundry Equipment Manufacturers Association.

IRON AND STEEL SCRAP CONSUMPTION

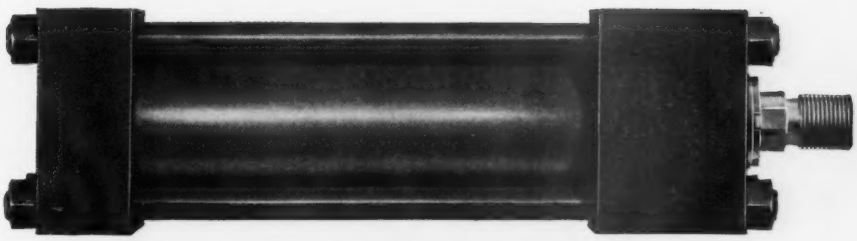
(Gross tons*)

	All Scrap Total	By Types of Furnace — Cupola Total	Air Total	Electric Total
1955	72,654,925	10,786,957	1,273,470	8,757,593
1956				
Feb.	6,345,421	892,373	116,418	833,661
2 mo. ...	13,034,398	1,801,574	230,796	1,714,641
Mar.	6,733,076	923,912	101,087	863,950
Apr.	6,490,680	862,233	96,514	842,216
May	6,491,567	855,007	104,485	899,967
June	5,994,989	776,299	87,525	831,456
July	1,986,613	621,064	56,071	399,441
Aug.	5,453,927	803,123	92,200	807,131
Sept.	6,231,017	738,824	84,627	841,783
Oct.	6,722,320	890,389	101,773	935,008
Nov.	6,305,947	822,542	95,890	875,524
Dec.	6,264,955	722,320	82,160	851,770
Total	71,709,489	9,817,287	1,133,128	9,862,887
1957				
Jan.	6,630,804	874,764	102,782	927,499
Feb.	6,038,436	804,185	93,902	834,843
2 mo. ...	12,669,240	1,678,949	196,684	1,762,342

PIG IRON PRODUCTION AND CONSUMPTION

	Production** (Standard grades—net tons) Total	Foundry	Malleable & Silvery	Basic	Low Phos. Intermediate Low Phos. & Bessemer	Consumption* (By type of furnace—gross tons) Total	Cupola	Air	Electric
1955	77,114,073	2,858,957	3,884,971	62,570,394	7,799,751	68,944,698	5,326,534	260,008	246,406
1956									
Apr.	6,860,833	210,319	333,660	5,623,647	693,207	6,077,074	413,537	22,757	17,179
4 mo. ..	27,469,854	847,047	1,374,000	22,624,289	2,624,518	24,540,958	1,713,140	94,863	60,680
May	6,873,102	232,375	329,750	5,625,067	685,910	6,064,632	413,494	24,074	28,596
June	6,387,608	213,769	331,871	5,227,488	614,480	5,642,004	379,803	22,039	23,460
July-Aug. .	6,191,039	337,077	382,633	4,854,879	616,450	963,749	303,341	14,702	5,582
Sept.	6,873,352	236,809	316,590	5,636,288	683,665	4,618,718	404,948	22,719	17,604
Oct.	7,246,650	245,762	321,188	6,001,279	678,421	6,053,147	366,848	19,642	18,239
Nov.	6,977,457	140,277	354,573	5,831,885	664,051	6,450,404	446,449	22,548	19,064
Dec.	7,268,743	149,745	322,631	6,099,101	697,266	6,237,538	391,632	21,557	17,161
Total ...	75,301,134	2,402,861	3,733,258	61,900,276	7,264,761	60,571,150	4,419,655	242,144	190,386
1957									
Jan.	7,209,547	135,608	344,073	6,081,137	648,699	.....	.....	.....	.....
Feb.	6,596,133	154,543	294,491	5,414,732	730,794	.....	.....	.....	.....
Mar.	7,179,100	168,650	347,451	6,008,135	654,864	.....	.....	.....	.....
Apr.	6,810,102	162,023	329,180	5,686,507	632,392	.....	.....	.....	.....
4 mo. ..	27,793,279	620,824	1,315,195	23,190,511	2,666,749	.....	.....	.....	.....

*Source: U.S. Dept. of Interior. Bureau of Mines. **Source: American Iron & Steel Institute. [1]Source: Bureau of the Census. [2]For Sale only.



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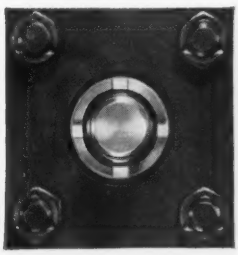

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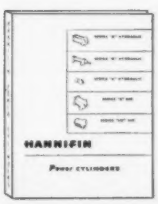
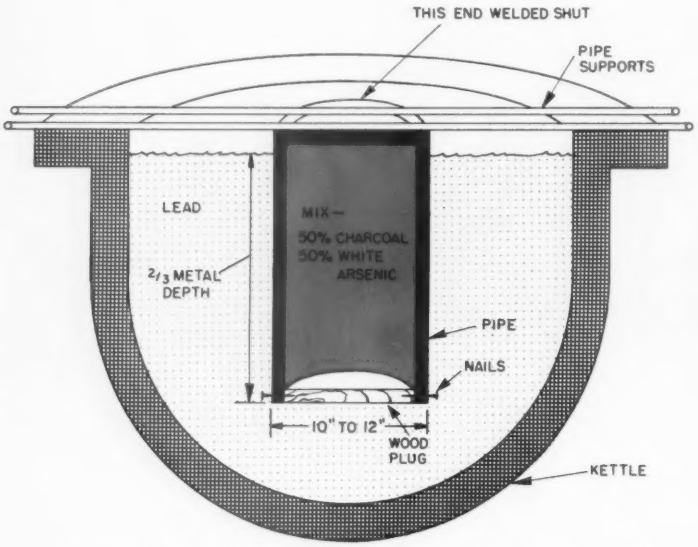


Trouble Shooting

By C. W. AMMEN



Pipe containing the arsenic mix should extend two-thirds of the depth of the metal in the kettle to be effective

Making Arsenic Additions

Dear Charlie:

What with all the new methods and equipment available to the foundryman today, one really has to keep on the jump to stay with the crowd. The condition is a good one, however, and makes for keen competition. Personally, I have been very much interested in the CO_2 coremaking process, and I read everything I can find on it. With the exception of one job, a medium-sized aluminum bronze pump case, I have had good results. These pump case cores are hard to remove. Oh well, we will work her out O.K. I am getting away from my question, which probably has so simple an answer that it will make me blush with shame.

We have a medium-sized lead melting kettle of about 3500-lb capacity, which we use to make up lead for boat keels and for castings. The problem is this: We buy lead alloy from a smelter, to specification, and never have had an occasion to attempt making any adjustment, but we now are faced with a customer who wants additional arsenic added to the lead we have on hand for his castings.

What kind should we use and how do we get it to alloy with the lead? I understand this procedure is a dangerous deal and is apt to send one to his reward if not handled properly.

Sincerely,
Sam

Dear Sam:

Arsenic *is* dangerous—enough so that it has been used for other purposes than making up lead alloys. It is my understanding that it has been used for many moons as a means to an end either with or without the knowledge of the bozo on the receiving end, and has been alloyed with tea, coffee, etc., with relative ease and gratifying results. But for the unwary foundryman to send himself to the happy hunting ground by mishandling arsenic in any form is considered indeed unfortunate.

Arsenic can be added as metallic arsenic, white arsenic or a purchased toner metal. In any event, the danger is there, and the fumes as well as the arsenic are extremely poisonous and dangerous. The kettle must be well hooded, and anyone handling arsenic should wear an approved respirator in good condition. The arsenic should be handled with rubber gloves, incidentally. To say the least, if not handled properly it will poison hell out of you.

If by now you have not run off your customer, here are two methods of introducing the arsenic into the lead. As_2O_3 (white arsenic) can be mixed to a puttylike plasticity with used lube oil drainings. This mixture then is ground into the kettle of metal at about 1000°F. This is the way I would not try, but I have seen some stouthearted ginks use it.

The second method not only is safer, but it requires less work, will produce good results and can be done at night since it takes several hours. For your kettle of 3500 lb capacity cut a piece of 10 to 12 in. pipe to a length equal to two-thirds the kettle depth. Weld one end up tight with a piece of ¼-in. plate. About ¼ in. from the open end, drill four holes, each large enough to take a 6 or 8-penny nail, equidistant around the diameter.

Across the closed end, weld two pieces of ½-in. pipe or suitable strap iron long enough to bridge the kettle with the pipe in the center. The pipe is inverted and filled about three-quarters full of a mixture consisting of 50 per cent powdered charcoal and 50 per cent white arsenic. The open end is closed with a wooden plug cut to fit the inside of the pipe and nailed in place.

The metal is raised to a temperature of 950 to 1000°F, and the loaded pipe is inverted into the center of the kettle, wooden plug down. The plug will burn out, leaving a reducing atmosphere and about 75 per cent recovery of As can be made. Up to 2.5 per cent As can be added to the lead. Leave the pipe in overnight. Although this method is less dangerous, take all the same precautions against poisoning—that is, use the hooded kettle, mask and gloves.

This method is simple and has a

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Circle 702 on Inquiry Card—Page 51

Neff & Fry Silo used for calcined coke

Many of our silos are currently being erected for handling and storing calcined coke. Scores of them have been in use for the same purpose over the years. The photograph shows one such installation in Pennsylvania. It is 24 ft. dia. x 60 ft. high.

There are a number of special problems in designing systems for handling calcined coke and other materials of similar consistency. Our knowledge of the subject can be of great practical value. We'll be glad to communicate or confer with you.

Our silos are constructed of Super-Concrete Staves with diagonal ends which permit steel hoops to impinge directly upon the horizontal joints. As many intervening hoops are installed as needed to met the lateral thrust of the contents. This is clearly explained in our folder, "Bins With the Strength of Pillars." A copy is yours for the asking.

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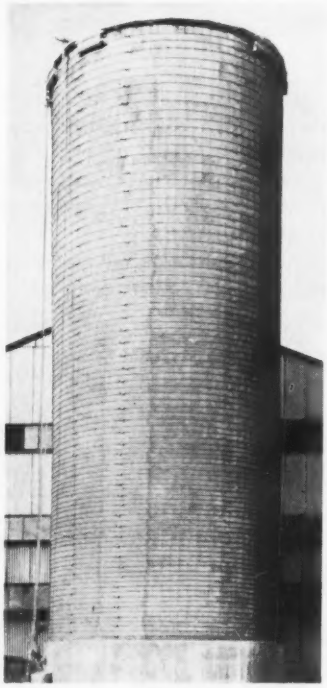

SUPER-CONCRETE STAVE STORAGE BINS

THE NEFF & FRY CO.

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further advantage in that metallic arsenic is quite expensive compared with the white arsenic used in this method. Of course, you could make a toner metal by this method in a smaller rig to use as an adjusting alloy. To get the correct percentage of arsenic in the total melt takes a bit of practice.

Your mention of the problem in getting the CO_2 cores out of pump shells brings a point to mind. I have had only a little experience with the process, but a friend of mine makes a water-cooled grate which is so designed as to leave little room for core removal, regardless of how well the core collapses, and he is making the cores with CO_2.

He told me that his first attempts were like yours, but he added 1½ per cent seacoal to the mix, and the cores now fall out with no trouble at all. I will try this myself some day. Am passing it on to you as a possibility, but I don't know about it from personal experience. So if you blow the joint up, don't blame me.

If I run across your name in the obituary column of FOUNDRY, I will know that your attempts to introduce arsenic into lead went amiss! All joking aside, you should have no trouble. Just be careful.

Sincerely,
Charlie

Book Review

Applied Strength of Materials, by Alfred Jensen, cloth, 343 pages, 6 x 9 in., published by McGraw-Hill Book Co., New York. Price $5.75.

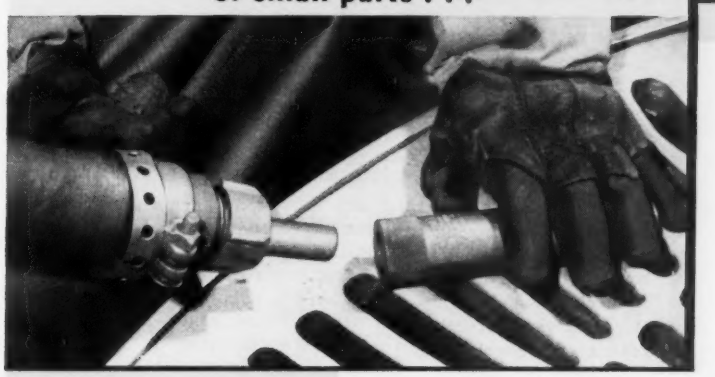
Intended as a one-semester college level text, this book is designed to acquaint students with the strength and other properties of various engineering materials and to show how to design structural members and connections commonly found in machines and buildings.

Design formulas have been developed without the use of calculus. Rather, the author has relied on explanations of existing physical relationships and on discussions of cause and effect, action and reaction.

The chapter on properties of engineering materials and methods of manufacture is intended to provide an elementary understanding of some of the most commonly used materials. However, sections on cast iron and aluminum are so sketchy and incomplete that they create an erroneous impression regarding these metals and the casting process. The author is undertaking a revision of these particular sections in the next printing of the book.

BLAST!

or small parts . . .



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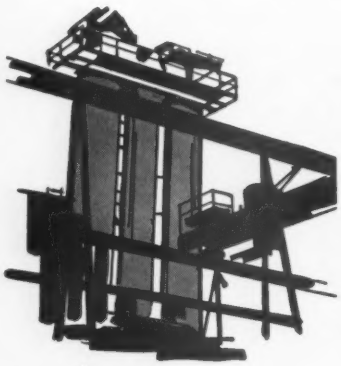

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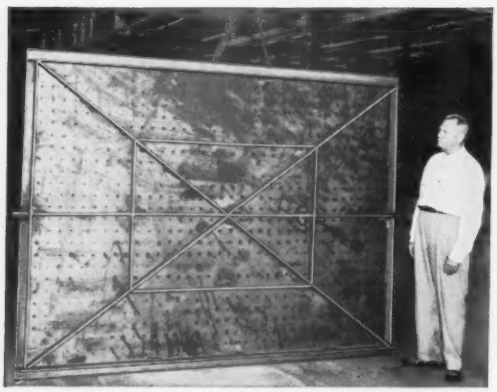
Circle 705 on Inquiry Card—Page 51

HERE'S "TOPS" in BOTTOM BOARDS



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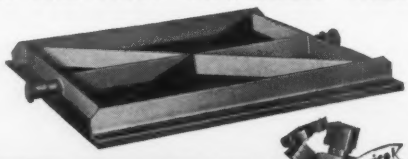

Sterling FOUNDRY EQUIPMENT

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Circle 706 on Inquiry Card—Page 51

Lifting Heavy Weights Calls for Precautions

Here's a Survey of Some Effects of Bad Practices

By Dr. W. Schweisheimer

LIFTING heavy loads is part of the routine job for many men. Such work places excessive strain on back, shoulders and abdominal muscles and on the heart. Mechanical lifting appliances should be provided where practicable, or if lifting operations are done by hand, suitable aids should be furnished to reduce vertical lift as much as possible.

How Lifting Affects the Heart—A healthy heart, well trained by long practice, will not revolt against extra strain imposed upon it by heavy lifting. A man can be an excellent industrial worker without being athletically built. His heart may do a good job for average work, but suffer under exaggerated strain. The heart is a muscle, and it will tire from overstrain, just as arm or leg muscles do.

A case discussed recently in the *Journal* of the American Medical Association described a man known to have had a heart condition and high blood pressure for years who died suddenly while lifting a heavy object. No autopsy was held. The death certificate listed the cause of death as undetermined. An industrial physician was asked whether lifting a heavy object could have brought on a fatal "heart attack."

The *Journal* stated that in lifting a heavy object, one attempts expiration against a closed glottis (the narrow opening at the upper part of the windpipe). This effort causes an increased pressure inside the chest, and this pressure in turn leads to a reduction of the flow of blood to the heart. The flow within the coronary arteries which feed the heart muscle consequently is lessened. In an already diseased heart, especially an arteriosclerotic heart, this decrease in the blood flow within the coronary arteries can be enough to produce severe heart damage.

Don't Lift More Than 130 Lb—Experts have calculated that men should not lift loads more than 130 lb, and women should not lift loads of more than 65 lb for intermittent work and 50 lb for continuous work. Raising a load from the feet is particularly difficult.

Excessive exertion by lifting or pushing gives rise in a healthy man to signs of breathlessness, palpitation of the heart, giddiness, fatigue and pain near the heart. Such signs are

the normal answer of the body to strain. The best advice is to avoid overexertion and call a fellow worker for assistance in lifting heavy loads.

Eight Rules for Avoiding Damage—The Bureau of Labor Standards, Washington, has issued a series of rules to keep in mind when carrying heavy loads.

1. Always carry the load close to the body.
2. Keep the back as straight as possible.
3. Lift with the leg and arm muscles.
4. Always have a clear vision over the load.
5. If the load interferes with normal walking, get help.
6. Never be afraid to ask for help in handling a load.
7. Bring in suggestions when you think some type of mechanical equipment will do a better job.
8. Don't permit tripping hazards or objects on the floor. They can cause persons carrying a load to fall and be seriously injured.

Production of Hernia—If a man feels unfit to perform weight lifting operations, he should not fail to report immediately to his foreman or supervisor. People who are indisposed have more accidents and injuries due to muscular strain. Lighter work can be provided for these occasions. The foreman or supervisor who studies the hazards peculiar to his shop or plant when lifting operations are undertaken can take the necessary steps to prevent this common cause of injury.

If a foreman knows that one of his men has a physical weakness such as a tendency toward hernia, he should not put him on jobs where heavy lifting is required. A violent exertion or strain may enlarge a gap in the muscle wall of the abdomen and cause a hernia.

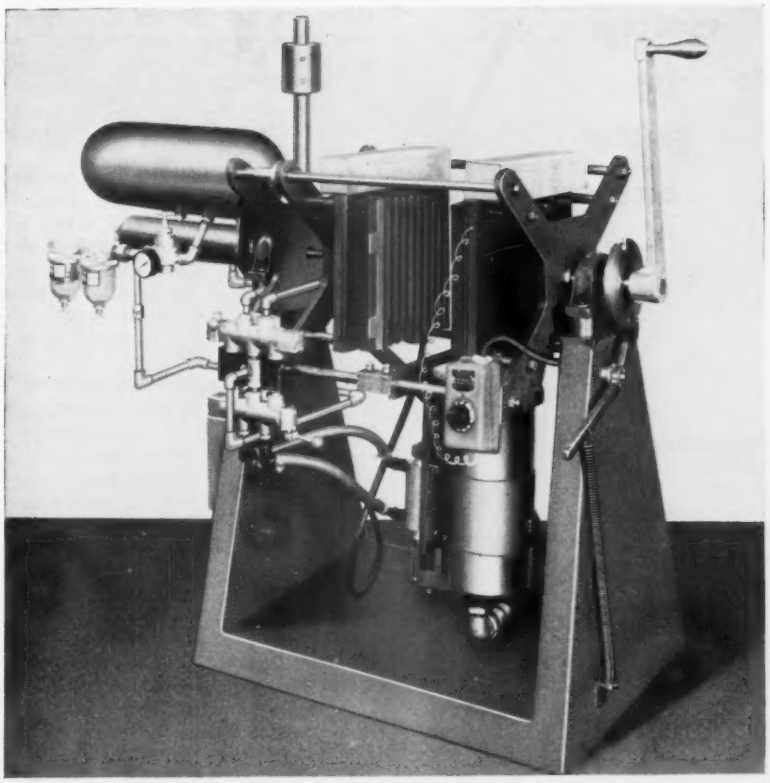
A hernia is the protrusion of a loop of intestine through a weak spot on the muscle wall of the abdomen. One cannot see this loop for it is covered with skin and fat. All that is visible is a small lump under the skin. By far the greatest number of hernias which occur in industry are inguinal hernias. They appear in the groin, on either right or left, and amount to approximately 96 per cent of all hernias.

Trusses are not always sufficient to keep a hernia back. An operation may be necessary to restore full working capacity to a man who suffers from a hernia and cannot avoid lifting heavy loads.

How Lifting Affects Nerves—A worker in a foundry overstretched his right arm while he was carrying a heavy sack. The next day, the man felt a dull pain in his right shoulder.

See our newest

MASTER



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Pyro Lance models are available for a wide variety of metals and foundry operations. Write today for Bulletin 1724-D and see how you can have low-cost quality control in your foundry. Illinois Testing Laboratories, Inc., Room 511, 420 North LaSalle St., Chicago 10, Illinois.

Alnor

PRECISION INSTRUMENTS FOR EVERY INDUSTRY

Circle 708 on Inquiry Card—Page 51

An important nerve had been under pressure because of the heavy load. He could not move his arm in a normal way, and although he had various kinds of medical treatment, his condition did not improve for several weeks.

Most nerve fibers which join muscles and brain are wrapped in a good layer of fat or tissues. On some places, however, they are more superficial, and strong pressure from a heavy load may injure them. Traction on the arm, a fall on the shoulder or pressure on the shoulder from above by a heavy load may affect one or several nerves.

The arm muscles then feel weak. They lose strength. An arm or hand may be even paralyzed. When a shoulder nerve has been injured by excessive strain, some time may be required for full recovery. Proper treatment and avoidance of heavy lifting will restore the normal function of the nerve.

Common Cause of Backache—The onset of acute backache (lumbago) may be dramatic in its suddeness. For instance, an industrial worker lifts a load, too heavy for him, which puts excessive strain on his back muscles. Some fibers are ruptured, and he is struck with violent pain in the small of the back. He must lie down on the floor, and he cannot get up.

Later the pain eases, and he is able to move again, in most instances. Despite the violence of the pain, it may disappear soon. There is every reason not to repeat the heavy strain for quite some time. People who have suffered from sudden backache may easily get the same trouble again unless they are cautious.

Knock-knees and other leg conditions occur less often today, primarily because of the use of mechanical devices. Where machines cannot be used, the best means of lifting loads by hand have to be explored. The foreman should suggest the construction of platforms and racks, the use of benches or similar aids.

The feet carry the whole weight of the body, and additional weight caused by lifting heavy loads presses the arches down. After repeated strain, they stay down—flat feet have developed. Arch supports in one form or another are an excellent means of bringing relief.

Women and Heavy Weights—The selection of a woman for a job requiring constant lifting, carrying, pushing or pulling should depend not only on her weight and height, but on the amount of strength she has.

There is a general belief that the most economical load is about 35 per cent of body weight, but this rule may not apply to the individual case. Some states have laws that limit the amount of weight that women workers may lift. Regulations differ in various states, but 25 lb is the usual limitation for lifting and 15 lb for carrying.

In California, for example, the law limits weights to be lifted or carried by women to 25 lb in any trade or industry. In Massachusetts, the law prohibits lifting of cores with a total weight which exceeds 25 lb unless the woman is assisted by mechanical appliances that limit physical efforts to 25 lb. In Michigan, lifting of more than 35 lb or carrying of more than 20 lb when ascending stairs is prohibited for women. Overhead lifting or stacking is forbidden.

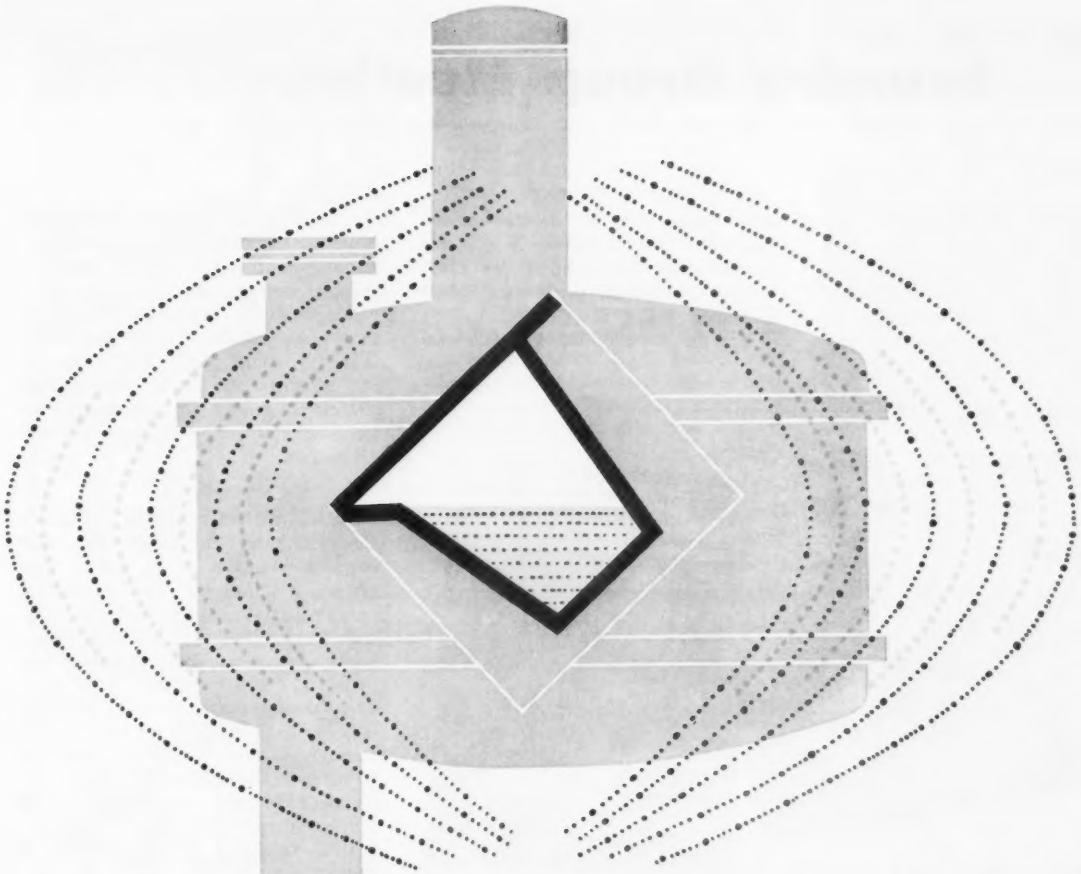
It has been found that heavy lifting tends to aggravate menstrual difficulties, and everybody knows that it should be avoided during pregnancy.

What Can You Do?—Here are some principles laid down by the Bureau of Labor Standards for lifting heavy loads: Size up the load first. Do not attempt to lift it alone if there is any doubt in your mind about your ability to do so. Make sure that your footing is secure. Get a good balance—this means feet fairly wide apart, about 8 to 12 in. Place the feet close to the base of the object to be lifted. This step is important because it prevents the back muscles from taking all the load. Bend the knees outward and "straddle" the load somewhat, keeping the back as straight as possible. Now start pushing up with your legs, using your strongest set of muscles. Keep the load close to your body as you come up, taking full advantage of the mechanical leverage your body now possesses.

Lift the object to the carrying position. If it is necessary to change your direction when you reach the upright position, be careful not to twist the body. Turn your body with changes of foot position. If you deposit the load on a bench or a table, place it on the edge to make the table take part of the load. Then push it forward with the arms or, if necessary, with part of the body.

In putting the load down to the floor surface from a waist high carrying position, bend the knees and, with a straight back and with the load close to the body, lower the load with arm and leg muscles.

Shaw Process Development Corp., Port Washington, N. Y., has licensed three firms to use the Shaw Process of investment casting. They are Precision Plastics, Philadelphia; Star Foundry, Fort Wayne, Ind., and General Mold Casting, Newark, N. J.

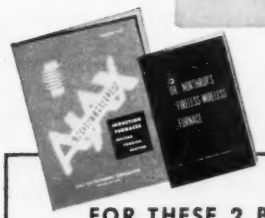


Vacuum melting was built around an Ajax induction furnace

Vacuum melting, as we know it today, combines "ideal" vacuum equipment with an induction furnace. But in 1920, Ajax had the induction furnace, and decided not to wait for the "ideal" vacuum.

In that year, Ajax began supplying 5 lb. vacuum furnaces to industry. Ajax still supplies vacuum furnaces, but in capacities up to 2000 lbs. In fact, of all the vacuum melting equipment installed during the past ten years, the majority have been built around Ajax-Northrup induction furnaces and controls.

If you are interested in pioneering the new "super alloys" through vacuum melting, Ajax experience can be of inestimable value. Write for the booklets shown opposite to find out why. Ajax Electrothermic Corp., Ajax Park, Trenton 5, New Jersey.



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Induction heating melting

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Foundry Group Meetings

Metropolitan: "The Indian Point Story" was the subject of a talk by Charles E. Hoppin, Consolidated Edison Co., at the April meeting of the AFS chapter. He discussed the use of atomic energy to the peacetime application of electric power generation with emphasis on the problems by his company in planning its proposed generating plant at Indian Point, N. Y.

In a comparison between the cost of usable electrical energy generated from conventional fuels and from fissionable material, he stated that although present economics favor conventional fuels, improved technology in the use and handling of fissionable material could very well cause it to become the most economical source of energy for power generation.—*P. H. Flynn, International Nickel Co.*

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ALL WELDED sheet steel construction provides the extra durability that means longer life . . . lower maintenance.

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San Antonio Section: Thirty-one members and guests of the AFS chapter met Apr. 27 at Alamo Iron Works, San Antonio, Tex., and had a lively discussion of "Shifts in Cope and Drag Molding." Refreshments were served by San Antonio Machine & Supply Co.

At the chapter's May 20 meeting, officers for 1957-58 were elected. The incoming chairman is William Merkle, Kincaid-Osburn Electric Steel Co. Kenneth E. Kielty, Alamo Iron Works, will serve as vice chairman and Dennis M. Yell, San Antonio Machine & Supply Co., will be secretary-treasurer. The next meeting will be in September.—*Kenneth E. Kielty, Alamo Iron Works.*

Michiana: Final regular meeting of the season was attended by 108 members and guests of the AFS chapter at Spaulding Hotel, Michigan City, Ind., on Apr. 8. Frank Pedrotty, Wheelabrator Corp., Mishawaka, Ind., talked on blast cleaning from its inception in industry to present day airless blast cleaning equipment used in automated plants. Various applications were shown in a series of slides, and a movie highlighted some modern automatic cleaning operations.

Results of balloting for chapter officers were announced. James C. Maggart, Sibley Foundry & Machine Corp., South Bend, Ind., will serve as chairman next year. Vice chairman will be Philip M. Semler, Auto Specialties Mfg. Co., St. Joseph, Mich., and Edward C. Zuppann, Bendix Aviation Corp., Lake Shore Division, St. Joseph, Mich., will be secretary-treasurer.

Directors (three year term) are: Arden Pridgeon, Benton Harbor Malleable Industries, Benton Harbor, Mich.; Vern Compton, JoSam Products, Michigan City, Ind.; Victor

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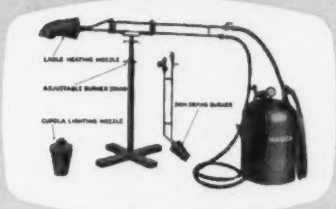

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Baldwin, Sibley Machine & Foundry Corp., South Bend, Ind., and A. J. Stanczyk, Clark Equipment Co., Buchanan, Mich. Ladd Shramek, Bendix Aviation Corp., Lake Shore Division, St. Joseph, Mich., will serve a one-year term on the board.

In the chapter's apprentice contest, James Tim and J. P. Wuthrich, both of City Pattern & Foundry Co., South Bend, Ind., placed first and second, respectively, in the wood pattern division. Donald Kovatch and Charles Graham, both of Torrington Co., South Bend, Ind., placed first and second, respectively, in the nonferrous molding division.—*Richard G. Wiest, Dalton Foundries Inc.*

Ontario: Fourth annual Ladies Night was held Apr. 26 at the Royal Connaught Hotel, Hamilton, Ont. A reception, social hour, dinner, floor show and dancing were highlights of the program for the 265 persons attending.—*L. H. Burbage, Otis Elevator Co. Ltd.*

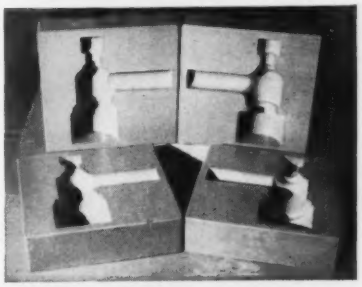
Wisconsin: The AFS chapter's annual Old Timers and Apprentices Night was held May 3 at the Schroeder Hotel, Milwaukee. Sixty-three old timers (foundrymen with 50 years or more in the industry) and 74 apprentices attended the meeting. New initiates into the Old Timers Club were presented with plaques suitably inscribed.

Four apprentices from the area were winners in the national apprentice contest (see News Views, page 154) and were presented with awards from the chapter. Prior to dinner, separate receptions were held for the old timers and apprentices. Following dinner, a floor show was presented in the Crystal Ballroom of the hotel.—*John B. Hubel.*

Pittsburgh: Second meeting of the AFS chapter's educational program was held May 20 at Webster Hall Hotel, Pittsburgh, and emphasis again was centered on problems involved in obtaining skilled workers for the foundry industry. Speaker was Earl M. Strick, finishing superintendent, Erie Malleable Iron Co., Erie, Pa. Attendance was 130.

Since foundry workers, on the average, are older than other workers in industry, the foundry industry must train many workers for replacement purposes. In Erie, foundries have an educational program aimed at the secondary school level to recruit and train craftsmen. Student forums are promoted and students are invited to foundry group meetings. Films are shown at

16 HOURS VS. 65 HOURS



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80% STEEL — 20% PLASTIC

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PLASTIC STEEL . . . originally developed for making tools, jigs and fixtures in metalworking plants . . . brought a revolutionary new method to this leading foundry* . . . chopping hours off the time required to produce core boxes, molds, duplicates of wood and metal patterns. Tremendous savings are being shown daily . . . making low cost patterns, repairing and altering patterns, filling large or small blow holes in ferrous and non-ferrous castings, repairing and rebuilding machinery, and making blow boxes and shell molds or driers.

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Circle 712 on Inquiry Card—Page 51

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is to get
CLEAN METAL
and one way to get
CLEAN METAL
is to strain it through
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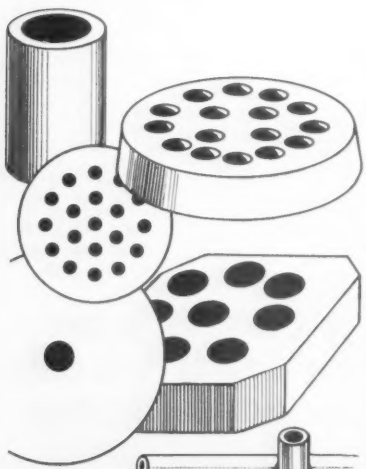
Fusion point, well above 3056°, makes them safe to use with any metal. Tubes or cores any diameter, any length. Send used samples or prints for quote. High quality, superior products, prompt delivery.



DU-CO CERAMICS CO. Butler 10, Penna.

Circle 713 on Inquiry Card—Page 51

schools as part of a plan to sell the industry.

Mr. Strick suggested that more information about the foundry industry be made available to teachers' colleges. Consultations between foundrymen and teachers would be helpful and teachers should be solicited for support in getting across to students the correct kind of information about the industry.

Before Erie began its educational program, the speaker reported that there was great difficulty in attracting high school students to the foundry industry. One of the first measures undertaken by foundry groups in the city was to hold a foundry show. A model foundry was built and its operation demonstrated to visitors. More than 10,000 people visited the demonstration. Convincing the general public of the attractiveness of the industry has been a major factor in attracting Erie's secondary school pupils to the industry.—*Robert M. Love.*

Texas: First annual past chairman's dinner of the AFS chapter was held May 18 at Ridglea Country Club, Forth Worth, Tex., with about 100 members and guests present. Principal speaker was Dr. Wesley Wiksell, professor of speech, Louisiana State University, Baton Rouge, La., who presented a talk and demonstration on "Have You Tried Listening?"

Officers for the 1957-58 meeting season were elected. Elmore C. Brown, Whiting Corp., Houston, Tex., is chairman. Harold H. Judson, Quality Electric Steel Casting Co., will serve as vice chairman. E. A. Schlotzhauer, Federated Metals Division, American Smelting & Refining Co., will be secretary and James S. Ahrens, National Carbon Co., will be the treasurer.

Directors for three year terms are: William P. Cornelius, Giffels & Vallet Inc.; J. Pete Maenza, Dee Brass Foundry Inc.; F. W. Jacobs, Texas Foundries Inc., and W. W. Massey, Tennessee-Texas Alloy & Chemical Co.—*C. Eugene Silver.*

Northeastern Ohio: Observance of Oldtimers and Past Presidents Night marked the May 16 meeting of the AFS Chapter at Tudor Arms Hotel, Cleveland. On hand were 50 oldtimers with more than 40 years in the foundry industry and 14 of the 17 living past chairmen of the chapter.

During dinner, a strolling accordionist and a vocalist entertained the 200 foundrymen and guests who were present, and the same entertainers

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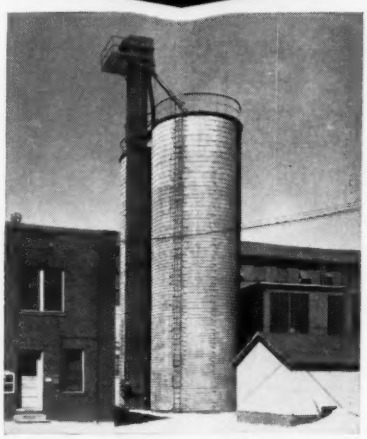

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led tables of oldtimers and past chairmen in a singing competition afterward. Former President L. P. Robinson acted as master of ceremonies for the contest and sang along impartially with each table. Certificates were presented to all oldtimers by E. C. Jeter, Ford Motor Co., Cleveland, chairman-elect of the chapter.

Membership of the chapter was announced to be at 803, and James Schwalm, Federal Foundry Supply Co., Cleveland, chairman of the membership committee, announced winners of the membership contest conducted by the chapter during the year. Thomas Kuhlman, Superior Foundry Inc., Cleveland, won first prize for nonmembers of the committee, and Charles Jelinek, Ford Motor Co., won membership committee honors.

Alex Barczak, Superior Foundry Inc., retiring chairman, expressed his gratitude to the many persons who had helped to make his term in office a success. Mr. Jeter spoke in appreciation of having been chosen as chairman for 1957-58 and said that after 29 years in the foundry, he also is looking forward to being an oldtimer.—*Jack C. Miske.*

Lehigh Valley: Over 100 members and guests of the Lehigh Valley Foundrymen's Association met Apr. 19 at Lafayette College, Easton, Pa., and heard Vincent P. Weaver, metallurgical engineer, American Brass Co., speak on "Development of Standard Specifications for Cast Copper Alloys." A film, "Copper Mining, Smelting and Refining," illustrating the Montana operations of Anaconda Copper Mining Co., was shown.

Preceding the technical talk, Dr. Ralph C. Hutchison, president, Lafayette College, welcomed the group and told of some of the college's facilities and services available to the foundry industry and of the intent of the college to be of further service in training students.

C. Robert Clover, chief of conservation education, public relations, State of Pennsylvania, showed a newly released film on "Fish Hatchery Management."—*R. R. Fischer, Ingersoll-Rand Co.*

Washington: The AFS chapter met Apr. 19 at the Engineers Club, Seattle, Wash., and heard M. E. Brooks, Dow Chemical Co., Midland, Mich., discuss "Magnesium Foundry Practice." The talk covered general problems and practices in melting, molding, casting and designing.—*E. F. Riedle, Puget Sound Naval Shipyard.*

Foundry Saves 12½ Hours With Arcair

Vancouver Iron Works, in British Columbia, uses the Arcair Process for removing excess metal from reaction-type turbine castings —"used to take 14 hours to remove the 2¾" thick, 6" high, 16" long metal. Arcair does it in 1½ hours and no cleanup is needed." Savings on overall preparation cost — 65%. This is typical of many jobs throughout industry where the Arcair process saves both time and costs. The process consists of a torch, a special type of electrode, ordinary shop air and an ordinary D.C. welding machine.

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Circle 715 on Inquiry Card—Page 51

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The Shakeout

Aluminum Impeller Whirls at 2000 Mph

A PRECISION-CAST, high-speed aluminum impeller fabricated by Aluminum Co. of America has been whirled at just under three times the speed of sound — at a peripheral velocity of about 2000 mph. The test was made to prove the value of new Alcoa aluminum alloys in high-speed, rotating part applications. Parts are rotated in a specially designed testing machine, or "whirl pit," until they fly to pieces. Reassembled, these pieces of aluminum, which are coated with brittle lacquer, reveal valuable information to test engineers.

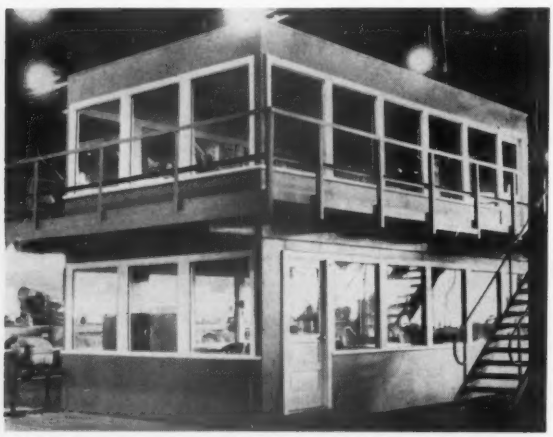
Most of the investigation has been conducted with alloys fabricated by various casting methods. Parts investigated have ranged in weight from less than 1 lb to almost a ton, in diameters up to 5 ft. Some have been spun without rupture at a pheripheral speed of 3000 fps.

For More Details Circle No. 497—Page 196

Acrylic Plastic Windows Prevent Breakage

FOR MANUFACTURING PLANTS where vibration, shock, flying metal chips or other factors cause frequent window breakage, the use of acrylic plastic glazing in the high-breakage areas is said to offer a practical remedy for the problem.

At Phoenix Iron & Steel Co., Phoenixville, Pa., vulnerable points were three supervisory mill offices, two situated in the seamless pipe mill and the third in the steel fabrication shop. The pipe mill offices, shown here, measure about 12 x 22 ft and are enclosed on all four sides by 40 x 48-in. windows.



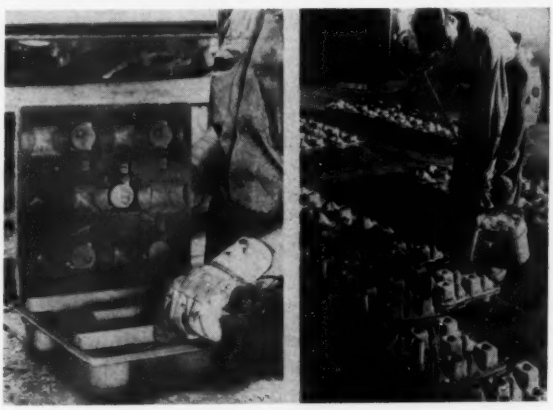
To eliminate the expense and nuisance of frequent window replacement both here and in the third office, the areas were glazed with ¼-in. panes of acrylic plastic, manufactured by Rohm & Haas Co., Philadelphia, under the tradename Plexiglas.

For More Details Circle No. 498—Page 196

Shell Molding Process Cuts Unit Costs

SHELL MOLDING has enabled Allied Chain Link Fence Co., Houston, Tex., to attain quantity production of cast aluminum fittings for its fences at low unit cost. Although shell molding usually is chosen because of the dimensional accuracy and close tolerances it offers, Allied based its decision to try the process on its simplicity and economy. The company was attracted by the possibility of unit cost savings from integrated, flexible production with less labor and fewer finishing operations.

Shell molds, bonded by Bakelite Co. phenolic resins (left photo), produce smooth as-cast surfaces. Instead of machining out holes for attaching fittings to fence posts,

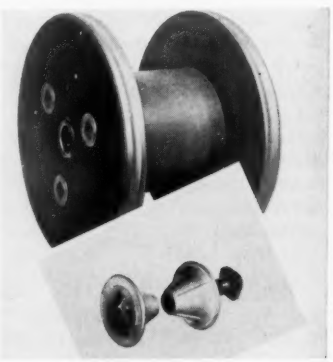


Allied uses the shell cores to form cavities in the fittings. The porous shell allows escape of gases during pouring of the molds (right photo).

For More Details Circle No. 499—Page 196

Die Castings Fasten Spools of Wire

SPECIALLY DESIGNED zinc die-cast pressure pads are being used to hold together large wooden spools to store wire. Unlike the previous fastener employed, they cannot work loose.



Manufactured by Paragon Die Casting Co., 5851 W. Dickens Ave., Chicago, for Howsam Spool Co., Aurora, Ill., the pressure pads are made so that one part of the fastener is placed under the head of the bolt. Pressure is applied against the end grain of the wood and causes the pad to hold tightly.

The pad is made of No. 3 zinc alloy cast in an eight-cavity die which makes four castings of each part.

For More Details Circle No. 500—Page 196

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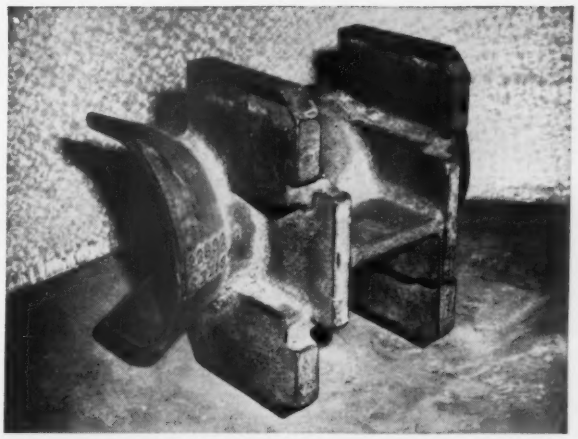
BOwling Green 9-0412

Circle 717 on Inquiry Card—Page 51



Half a pipe guide barrel for a tube mill—perfect, but ¼-inch too short on each of the four projections . . .

would you scrap this casting?

You *wouldn't* if you thought of Ni-Rod* electrode.

A mistake in the pattern — and a 300-lb. casting was 1/2" too narrow in total width.

Almost ready for the scrap heap! But nine lbs. of Ni-Rod electrode saved it — saved the foundry $150.

First, the short projections were ground down. Then three layers of Ni-Rod electrode were laid on — *with no preheat required.*

The final step: easy machining to the correct over-all width of 22" plus 0.000", minus 0.032".

When you repair defective castings with Ni-Rod electrode, you get sound, machinable welds easily. Ni-Rod electrode has another important advantage: *welds match the color of the cast metal closely.*

Ni-Rod and Ni-Rod "55"* electrodes (for heavier sections) simplify repairs, make cast iron welding easier. You can order them from your supplier in 5-lb. containers — 3/32-, 1/8-, 5/32-, and 3/16-inch diameters.

Do it today. And write for your copy of "Repair Cast Iron Parts Quickly and Easily." This folder shows many ways others are saving money by salvaging and repairing cast iron with Ni-Rod and Ni-Rod "55" electrodes.

*Registered trademark

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street — New York 5, N.Y.

INCO TRADE MARK **Welding Products**
Electrodes • Wires • Fluxes

Circle 718 on Inquiry Card—Page 51

HOW TO MEET FOUR COMMON FOUNDRY BUCKET REQUIREMENTS

BLAW-KNOX "SHARK TOOTH" BUCKETS HANDLE COKE WITH MINIMUM DEGRADATION

Use this versatile *dual-purpose* bucket for efficient coke handling. Without the liner plates, the shark teeth literally finger their way through the coke so it can be handled with minimum degradation. Hook-on feature permits quick change for other foundry service requirements.

BLAW-KNOX "SHARK TOOTH" BUCKETS *with liner plates* HANDLE SAND WITH MINIMUM LEAKAGE

This open head type Single-Line Hook-On Bucket *with liner plates attached* inside of the shark teeth, economically handles sand, coal, small limestone and granular fines with minimum leakage!

BLAW-KNOX SINGLE-LINE HOOK-ON TYPE BUCKETS FOR EXTREMELY LOW HEADROOM

This Single-Line Hook-On Bucket solves rehandling problems when headroom is extremely limited. The ¾ yd. capacity bucket requires only 6'7" operating headroom. Also available in larger sizes.

BLAW-KNOX SINGLE-LINE HOOK-ON TYPE BUCKETS FOR AVERAGE HEADROOM

There is a type and size of Blaw-Knox Single-Line Hook-On Foundry Bucket to meet a wide range of operating conditions. Blaw-Knox can best give you the competent engineering service that makes possible selection of the bucket best suited to your requirements.

Get complete details from BULLETIN 2232.

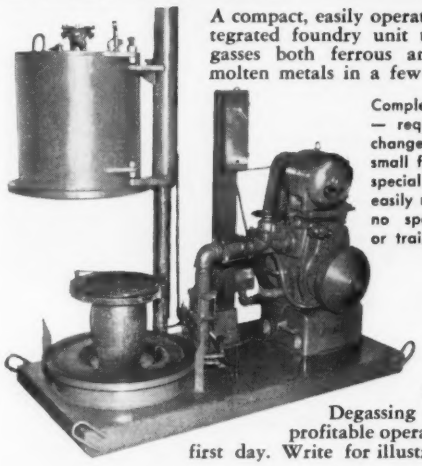
BLAW-KNOX COMPANY
BLAW-KNOX EQUIPMENT DIVISION
Pittsburgh 38, Pa.
Offices in Principal Cities

BLAW-KNOX FOUNDRY BUCKETS

BLAW-KNOX

THE MOST COMPLETE RANGE OF SIZES AND TYPES

REJECTS and SCRAP due to gas are practically eliminated by . . . Model 400 VACUUM DEGASSING CHAMBER



A compact, easily operated, entirely integrated foundry unit thoroughly degasses both ferrous and non-ferrous molten metals in a few minutes.

Complete package unit — requires no process changes — occupies small floor space — no special foundation — easily moved — requires no special experience or training.

Ruggedly built for foundry service.

This Vacuum Degassing Unit permits profitable operation from the first day. Write for illustrated bulletin.

CENTRIFUGAL CASTING MACHINE CO.
P. O. Box 947 Tulsa 1, Oklahoma

Circle 720 on Inquiry Card—Page 51

FOUNDRY

EDWIN S. CARMAN, INC.

LEE ROAD AT MAYFIELD
CLEVELAND 18, OHIO

A COMPLETE FOUNDRY SERVICE

CONSULTANTS

Circle 721 on Inquiry Card—Page 51

EMPIRE

"THAT GOOD" FOUNDRY COKE

DEBARDELEBEN COAL CORPORATION
2201 First Ave., North • Birmingham 3, Ala.
Phone: ALpine 1-9135

Circle 722 on Inquiry Card—Page 51

Circle 719 on Inquiry Card—Page 51

No. 4 DAYTON RING VALVE BENCH RAMMER

MORE POWER—MORE SPEED

You'll get more production with these faster, more powerful rammers and at the same time substantially reduce maintenance costs.

The Valve Units will last for years. The Cylinder Bores and Piston Rods are HARD CHROME PLATED which doubles the life of the Rammer. Many of the largest foundries in the country have already adopted them as standard. Made in six sizes to meet every requirement.

Send for Bulletin 300

DAYTON PNEUMATIC TOOL CO.

Manufacturers of Pneumatic Tools Since 1903

DAYTON, OHIO

Circle 723 on Inquiry Card—Page 51

OLIVER No. 21 Lathe is versatile, powerful . . . it reduces the costs of turning large patterns

The Oliver No. 21 Lathe is one of a complete line of wood-turning lathes found in pattern shops of leading engineering works. It swings 92″ diameter over sole plate, 100″ over floor, and any desired diameter over pit at rear of headstock. Between centers it cuts 6′6″, or lathe can be made special for greater lengths. A 5 h-p. belted motor gives wide range of headstock speeds. Head, tailstock, carriage columns mounted on sole plate built any desired length. Write for Bulletin No. 21.

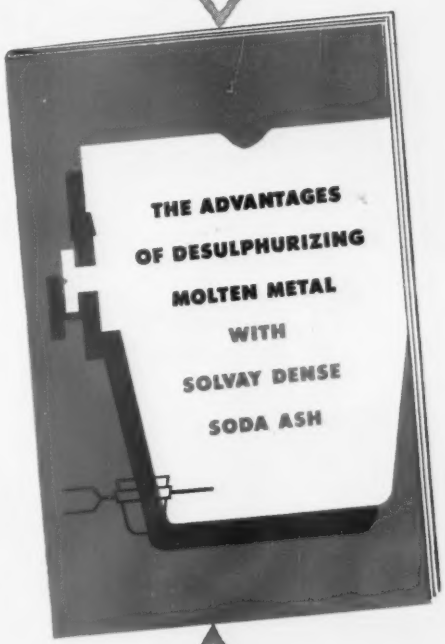
Oliver makes a complete line of Lathes and other Woodworking Machines for pattern shops.

OLIVER SINCE 1890

OLIVER MACHINERY COMPANY
Grand Rapids 4, Michigan

Circle 724 on Inquiry Card—Page 51

Full facts on Desulphurizing at *lowest* cost!



Tells how to apply —equipment to use!

SOLVAY DENSE SODA ASH costs less . . . melts rapidly . . . disperses uniformly. Free-flowing. Requires simple equipment.

SOLVAY ®

Allied Chemical

SOLVAY PROCESS DIVISION
ALLIED CHEMICAL & DYE CORPORATION
61 Broadway, New York 6, N. Y.

Please send me without cost your booklet—"The Advantages of Desulphurizing Molten Metal with Solvay Dense Soda Ash."

Name_____

Position_____

Company_____

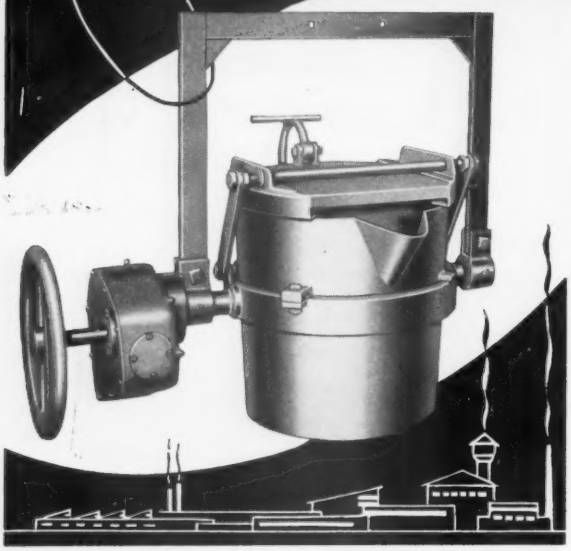
Address_____

City_____ Zone____ State_____ AT-7

Circle 725 on Inquiry Card—Page 51

JOB ENGINEERED
by
Industrial

YOU SEE THE DIFFERENCE WHEN YOU START TO POUR



All ladles look pretty much alike . . . but your crews can see and *feel* the Job Engineered advantages of Industrial ladles as soon as they start to pour.

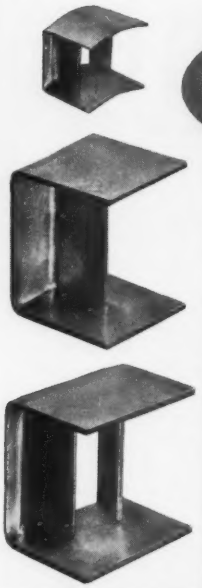
Industrial Job Engineered ladles handle smoothly and easily through the entire pouring routine—tipping, making the pour, straightening and moving on to the next mold. Industrial's special gearing assures precise ladle control at all times . . . and eliminates binding as a result of heat distortion of ladle bowl. One man can easily handle the entire pouring operation. That's why Industrial ladles pay off in lower costs, more efficient operation every time your crews pour a casting.

The ladle shown is for smaller pouring jobs. It is equipped with Bantam Gearing, and offers all the Job Engineered features of Industrial's larger ladles—dependability, ease of operation, accuracy, no binding, one man handling. Send your pouring problems to Industrial Equipment Company—manufacturer of a complete line of standard and custom pouring and handling equipment—Bowls . . . Shanks . . . Bails . . . Tongs. Write today for latest catalog.

Industrial
EQUIPMENT COMPANY
115 OHIO ST., MINSTER, OHIO

Circle 726 on Inquiry Card—Page 51

WHY POUR YOUR PROFITS AWAY?
save up to 50% on chaplets



Buffalo
ECONOMY CHAPLETS

Now you can save up to 50% on chaplet costs with Buffalo Patented Angle Stem and Double Angle Chaplets. They burn in more easily, without chilling. They are thoroughly coated to assure instant fusion with molten metal. And the unusual strength of the one-piece design permits fabrication in thinner gauges. All these features mean *savings to you.*

Furnished in a complete line of sizes and gauges, Buffalo Economy Chaplets are available in tinned steel, Monel, stainless steel and copper. Why not give them a trial? It costs only pennies to find out how many dollars you will save.

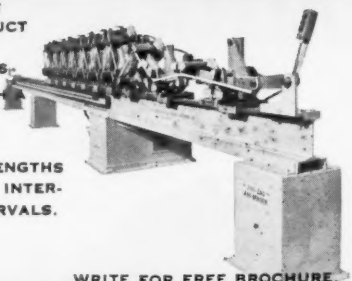
Write for literature on Economy Chaplets. For information on the complete "Buffalo" line, request Catalog No. 20.

MANUFACTURED BY
Combined **SUPPLY & EQUIPMENT CO., INC.**
211 Chandler St., Buffalo 7, N. Y.

Circle 727 on Inquiry Card—Page 51

Bar Joist Fabricators!

Continuous Webs
FOR SUPERIOR PRODUCT
MORE ORDERS—
GREATER PROFITS
AT LESS COST WITH
'ZIG - ZAG'



AVAILABLE IN BAR LENGTHS 10 TO 60 FT. OR ANY INTERMEDIATE 10 FT. INTERVALS.

WRITE FOR FREE BROCHURE.

EIDAL MFG. CO. P. O. Box 1299 Albuquerque, New Mexico

Circle 728 on Inquiry Card—Page 51

Complete REPAIR SERVICE on all makes METALLOGRAPHS, MICROSCOPES

Complete stock **LEITZ** *equipment for immediate demonstration and delivery. Guaranteed Reconditioned Instruments.*

MONROE MICROSCOPE SERVICE
P.O. Box 656 Rochester 2, New York

Circle 729 on Inquiry Card—Page 51

HIGH SILICA QUARTZITE PEBBLES

★ ★ ★

R. W. SIDLEY, INC.

THOMPSON, OHIO TEL. 2701

Circle 730 on Inquiry Card—Page 51

"Put it where you want it, while you watch it!"

with this Push-Button, Floor Controlled

EUCLID CRANE

AT WORK IN A LARGE AUTOMOTIVE FOUNDRY

Foundry cranes fall into a class by themselves as we see it.

Abrasive and corrosive atmospheric conditions that prevail in foundries make dirt and dust proof mechanisms imperative. Precision load control with trouble-free operations for long periods of service are requisite.

These and many other valued features are common to Euclid Foundry Cranes.

Push-button and rope pendent floor controls as well as overhead cab operation is available.

Euclid Cranes carry their share of the production load every day in foundries all over the world.

We can build any foundry crane you require.

A phone call or letter will put our services at your disposal.

Write for our Catalog on Cranes and Hoists.

EUCLID

RAISE PROFITS

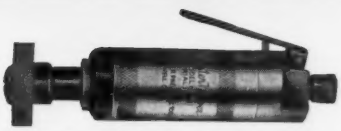
EUCLID HOISTS
for Dependable Service
2000 to 40,000 lbs. Capacities

THE EUCLID CRANE & HOIST COMPANY
1360 CHARDON ROAD
CLEVELAND 17, OHIO

Circle 731 on Inquiry Card—Page 51

Master Power

HARD CHROMED • PORTABLE PNEUMATIC TOOLS



DO MORE WORK AT LESS COST

because they deliver more power per cubic foot of air consumed, are light in weight for easier maneuverability and they retain their new tool power longer.

ARE PREFERRED BY OPERATORS

because they are lighter in weight, better balanced and designed to reduce shock and be free from vibration.

IF YOUR PROBLEM INCLUDES

chipping, ramming, grinding, buffing, sanding or wire brushing, *write us today for full particulars.*

THE MASTER PNEUMATIC TOOL COMPANY, INC.
ORWELL, OHIO • U. S. A.
SALES • SERVICE • STOCK • COAST TO COAST

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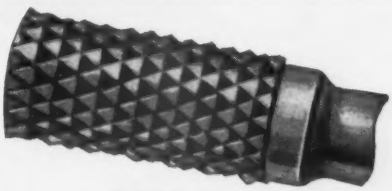


CARBIDE

SOLID and TIPPED CUTTING TOOLS

Stock Tools:

Burrs—Carbide • Drills—Solid Carbide and Tipped • Internal Grinding Burrs—Solid Carbide • Reamers and End Mills—Solid Carbide and Tipped • Slitting Saws—Solid Carbide • Rotary Files H.S.S.—Hand cut and ground from the Solid

Specials:

In addition to the foregoing, ESSEX maintains a special tool designing department and can supply the following in Solid Carbide and Carbide-Tipped Tools:
Tipped Tools • Counterbores • Step-Drills • Twist-Drills • Dies • Grooving and Milling Cutters • Key Cutters • T-Slot Cutters • Router • Bits • Profiling Cutters, Etc. to sketch or blueprint.
Complete resharpening and reconditioning, service available.

Areas available for distributors inquiries invited.

Makers of Fine Tools Since 1868

ESSEX ROTARY FILE & TOOL CORPORATION
295 MADISON AVE. • NEW YORK 17, N. Y.

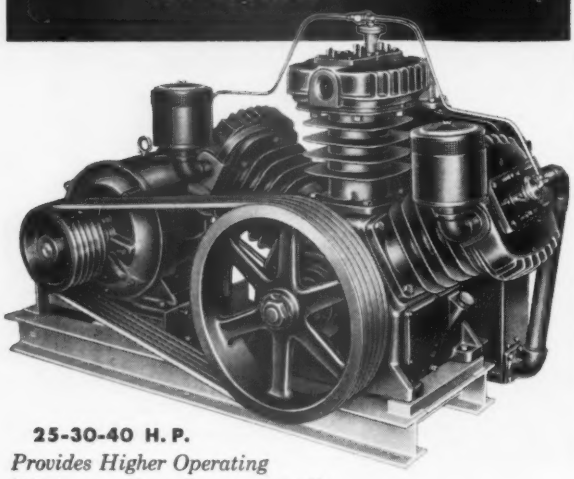
Circle 733 on Inquiry Card—Page 51

CURTIS MODEL C-100

Two-Stage, Air-Cooled Air Compressor

Delivers *MORE* Air...

PER MINUTE HORSEPOWER KILOWATT HOUR OF ELECTRICAL ENERGY CONSUMED



25-30-40 H. P.
Provides Higher Operating Efficiency Costs Less to Install

The Curtis Two-Stage Compressor assures a saving in your power costs. It's air cooled, thereby eliminating expensive water bills—quick and easy installation with no complicated plumbing problems.

The new C-100 embodies all the well-known Curtis engineering features such as centro-ring oiling and Timken Main Bearings.

For complete information write for illustrated folder.

YOU CAN COUNT ON REMEMBER...

Curtis

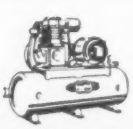
OUR 103rd YEAR

MANUFACTURING COMPANY

PNEUMATIC DIVISION

1922 Kienlen Ave. St. Louis 20, Mo.

AIR HOISTS
AIR CYLINDERS



AUTOMOTIVE
AIR COMPRESSORS

PACKAGED
AND
REMOTE
AIR
CONDITIONING

CM-21

No. 9-A Self-Dumping Swivel Wheel Bucket

PENN BUCKETS...

Careful balancing makes Penn Buckets self-dumping when loaded and self-righting when empty. Welded construction prevents "clinging", makes them empty easily and completely. The swivel wheel increases handling efficiency, too.

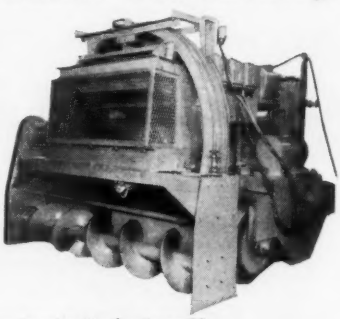
WRITE TODAY FOR NEW BULLETIN AND DIMENSION SHEET

PENN IRON WORKS, INC.
READING, PENNA.

Circle 735 on Inquiry Card—Page 51

STOP "KICKING" YOUR SAND AROUND and give it RINGLIFT Conditioning!

The RINGLIFT Sand Conditioner gets all sand up off floor, screens, magnetically separates, aerates, cools, adds moisture, mixes, and deposits in neat windrows. Velvety, open sand that assures much better castings. Real economy—up to a ton of sand per minute. Get a user's opinion! Send for bulletin.



STATES ENGINEERING
CORPORATION
920 W. Berry St.
Fort Wayne, Indiana

Circle 736 on Inquiry Card—Page 51

NCP makes effective PATTERN LACQUERS

1. Seals pattern to prevent moisture and water absorption.
2. Brushes easily—dries quickly.
3. Does not chip, peel, bubble, or blister, and is flexible.
4. Adds slip, promoting clean parting of pattern from sand.
5. Made in all colors.
6. Time tested material—successfully used in pattern shops all over the country for over 30 years.

The National Chemical & Plastics Co.
1424 Philpot Street Baltimore 31, Maryland

Circle 737 on Inquiry Card—Page 51

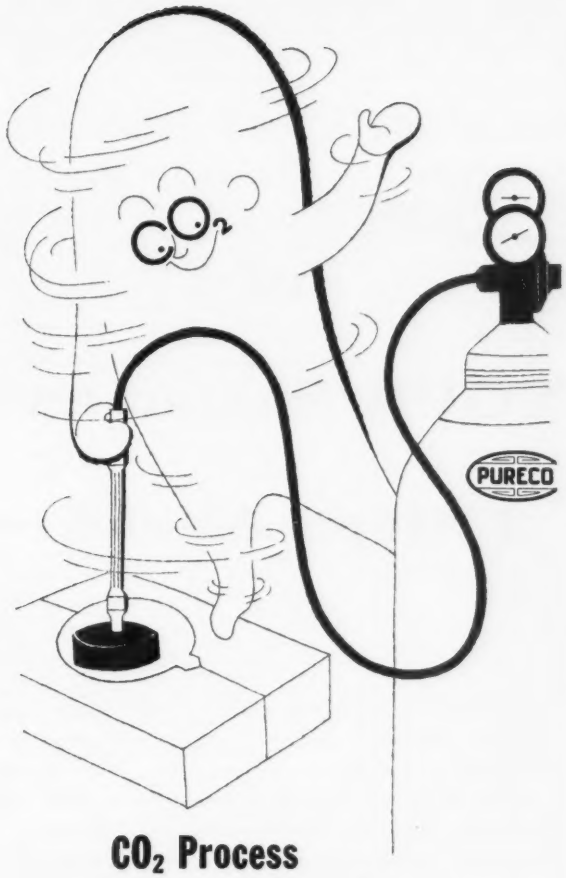
GLOSSARY OF FOUNDRY TERMS

Compiled by Ed Bremer, FOUNDRY Metallurgical Editor

This extensive glossary of foundry terms was compiled from a wide variety of sources. Arranged in handy booklet form, it is a valuable reference for every foundryman. 48 pages.

$1.00

PENTON PUBLISHING COMPANY, Book Department
1213 West Third St., Cleveland 13, Ohio



CO_2 Process cures molds and cores in seconds—without baking—Equipment Cost: Less than $100!

Pureco can tailor a CO_2 installation to meet your specific foundry requirements–whether they be large or small.

Call your nearest Pureco office for information regarding a complete line of CO_2 equipment and CO_2 supply systems–cylinders, cylinder banks, converters, receivers–all described in Bulletin #27. Write for your copy.

Remember–Pureco Technical Sales Service is anxious to serve you.

PURECO CO_2

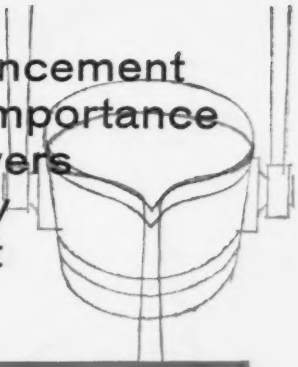
Pure Carbonic Company

A Division of Air Reduction Company, Incorporated
150 EAST 42nd STREET, NEW YORK 17, N. Y.

AT THE FRONTIERS OF PROGRESS YOU'LL FIND AN AIR REDUCTION PRODUCT

Circle 738 on Inquriy Card—Page 51

An Announcement of Great Importance to the Buyers of Foundry Equipment



affco

AMERICAN FOUNDRY FLASK COMPANY

The American Foundry Flask Company, a division of Cromb and Gagel, Inc., Kansas City, Missouri, announces the purchase of the sales and manufacturing rights to the "Perfection" or "BS&B" flask line made for over thirty years by Black, Sivalls and Bryson of Kansas City, Missouri.

This purchase included equipment, inventory, engineering data and all factors pertaining to the flask division of BS&B.

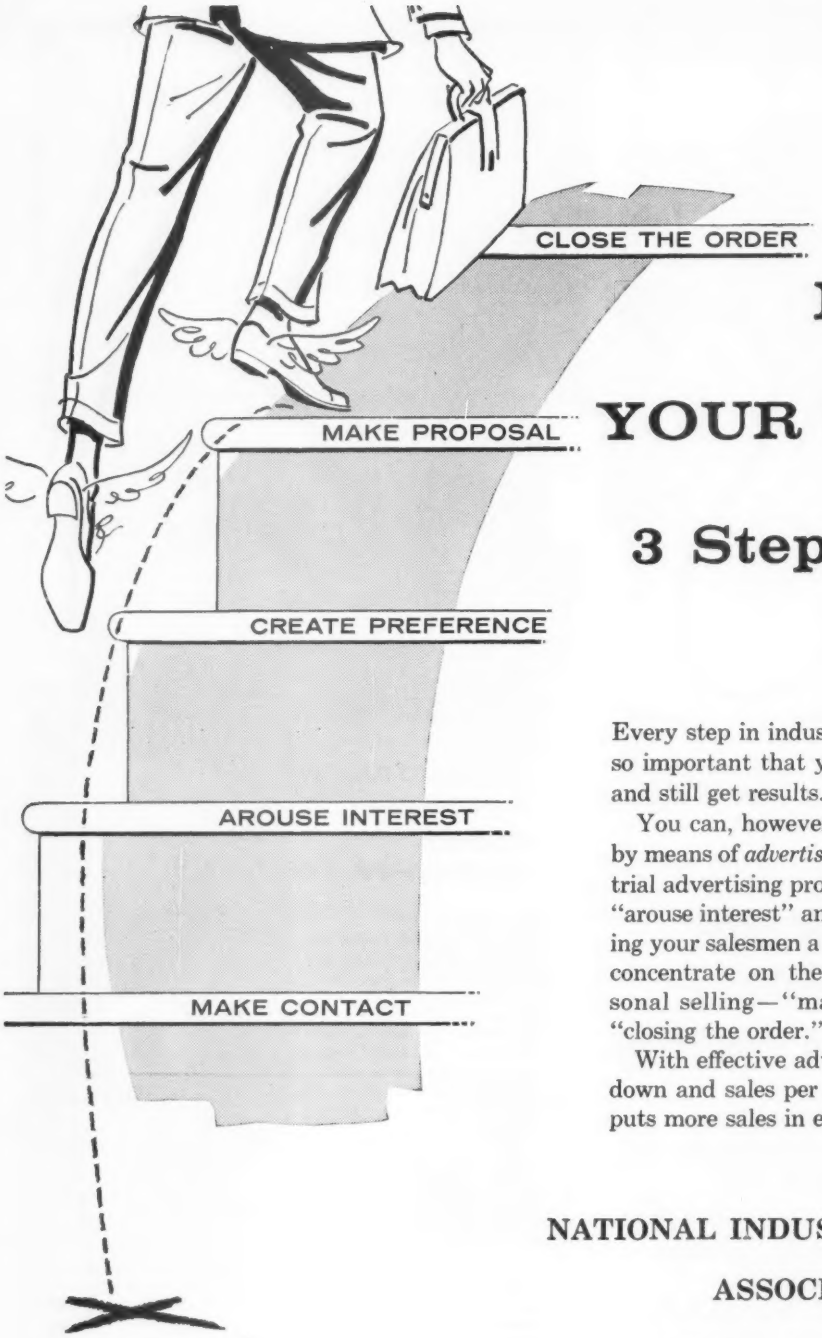
The same high quality, expert craftsmanship and engineering excellence previously found in this fine line of flasks will be continued, according to A. H. Cromb, president of the newly formed company. "Black, Sivalls and Bryson have set a wonderful and challenging record for us to meet and beat," said Mr. Cromb. "We are determined to both meet it and beat it."

C. E. "Joe" Boettcher, formerly sales manager of the flask division of Black, Sivalls and Bryson, has been appointed to the same position with American Foundry Flask Company. Mr. Boettcher's engineering and sales experience in the flask field are well known. American Foundry Flask will maintain the same lines of distribution that Black, Sivalls and Bryson previously used.

affco **AMERICAN FOUNDRY FLASK CO.**

2745 SOUTHWEST BLVD., KANSAS CITY, MO.

Circle 739 on Inquiry Card—Page 51



Put YOUR Salesmen 3 Steps Ahead

Every step in industrial selling is important—so important that you can't skip any of them and still get results.

You can, however, take the first three steps by means of *advertising*. A well-balanced industrial advertising program can "make contact," "arouse interest" and "create preference," giving your salesmen a three-step lead so they can concentrate on the steps which require personal selling—"making the proposal" and "closing the order."

With effective advertising, cost per call goes down and sales per call go up, for advertising puts more sales in every salesman's day.

NATIONAL INDUSTRIAL ADVERTISERS ASSOCIATION, INC.

271 Madison Avenue, New York 16, N. Y.

An organization of over 4000 members engaged in the advertising and marketing of industrial products, with local chapters in ALBANY, BALTIMORE, BOSTON, BUFFALO, CHICAGO, CLEVELAND, COLUMBUS, DALLAS-FORT WORTH, DENVER, DETROIT, HAMILTON, ONT., HARTFORD, HOUSTON, INDIANAPOLIS, LOS ANGELES, MILWAUKEE, MINNEAPOLIS-ST. PAUL, MONTREAL, QUE., NEWARK, NEW YORK, PHILADELPHIA, PITTSBURGH, PORTLAND, ROCHESTER, ROCKFORD, ST. LOUIS, SAN FRANCISCO, TORONTO, ONT., YOUNGSTOWN.

CLASSIFIED ADVERTISING

Help Wanted

FOUNDRY SHIFT FOREMAN

Position available in ferrous industry located in SOUTHERN CALIFORNIA. For man experienced in supervising employees engaged in ramming, pouring and shakeout of large iron castings. Applicants must be willing to work shifts. Send resume giving complete job history, description of duties and salary needs to:

BOX 635, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

ASSISTANT SUPERINTENDENT

Capable general supervisor needd in gray iron mechanized jobbing foundry in Wisconsin for light to medium production work. Opportunity for qualified man in progressive organization. Submit experience, education, age and salary expected.

BOX 636, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

MECHANICAL ENGINEER

Nonferrous foundry and machine shop needs plant engineer, preferably with finished bronze bushing experience, to supervise production in shop and foundry. General foundry experience in sand, permanent mold and centrifugal processes would be to advantage. In reply give age, education and experience. Address: Box 604, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

GRAY IRON FOREMAN

Mechanized gray iron foundry seeks experienced and qualified man for Melting Department primarily, and some sand control. Excellent opportunity for growth with the organization. Plant located in Northern Illinois. Please furnish resume, including salary requirements. Address: Box 631, FOUNDRY, Penton Bldg., Clevelan 13, Ohio.

COREROOM FOREMAN

To take charge of stove burner core production both hand made and blown in gray iron jobbing foundry in Central Ohio. Must be familiar with piece work production and small burner cores. Please send qualifications, references, late picture and salary requirements. Address: Box 639, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

HELP WANTED

We need an experienced electric melting furnace melter-supervisor. Salary open. Contact: Ivan Kerzner, NEW JERSEY METALS COMPANY, 712 ROCKEFELLER ST., ELIZABETH 2, NEW JERSEY; PHONE: ELIZABETH 4-6336.

SUPERINTENDENT

For nonferrous foundry. Excellent opportunity for man with good educational background and sound practical experience. Address: Box 600, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

HELP WANTED

Mechanical Engineer—with foundry background for production supervision in HEAVY CENTRIFUGAL FOUNDRY, NONFERROUS. Address: Box 599, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

OPPORTUNITY

For man to take charge of medium-sized foundry producing gray iron castings. Location in Colorado. Must have background (education or experience) in metallurgy sand control and cupola operation. Prefer man between 30 and 40. Send complete information and salary requirements. Address: Box 633, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Help Wanted

FOUNDRY METALLURGISTS AND ENGINEERS

Opportunity is knocking for a gray iron foundry engineer under 40 who

1. Would like complete charge of metallurgy, sand control, and plant engineering with a medium-sized gray iron jobbing foundry beautifully situated in New England.
2. Wants to grow with two young men in developing a well established business into an outstanding foundry.

This is a rare opportunity for a well-trained man to fit into a situation that is challenging, stimulating and rewarding.

BOX 610, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

FOUNDRY PLANT ENGINEER

Graduate. About 35 years of age and with 5-10 years of experience in foundry or steel mill plant engineering and maintenance. To serve as an assistant to Plant Engineer in a leading steel foundry in the east. Excellent opportunity, salary and working conditions. Write giving full details in confidence to:

BOX 603, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

ASSISTANT FOUNDRY SUPERINTENDENT

A medium sized company in the East, operating ferrous and nonferrous foundries, requires an assistant to the Foundry Superintendent who is approaching retirement. Experience in both type foundries is desirable, but at least five years' experience in brass pressure type casting essential. Supervisory experience also essential. Submit confidential resume covering education and experience, also salary requirement. Address: Box 642, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MOLDING FOREMAN

For steel foundry—Chicago area. Must know heading and gating for miscellaneous steel castings and be able to instruct trainees. Address: Box 630, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY ENGINEER

Challenging position in management engineering for young foundry engineer prepared to travel. Must know gray iron foundry operations, able to make layout drawings. Industrial engineering experience desirable. Reply with photo. Box 613, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

LAYOUT MAN

For metal pattern shop. Paid vacations and holidays. Steady employment. PROCESS PATTERN & ENGINEERING CO., INC., 1707 N. HARRISON ST., FORT WAYNE, INDIANA.

FOUNDRY SUPERVISOR

Excellent opportunity for applicant with supervisory experience in Sand Foundry or Core Room. Produce variety of jobbing and production castings. College training preferred. Outstanding challenge for bright person. Company offers liberal employee benefits program. Prefer age from 28 to 45. Location: Cincinnati, Ohio. Our employees know of this ad. Please send resume outlining education, experience and salary expected. Address: Box 646, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

PLANT MANAGER

New steel foundry under construction in Ontario has opening for man capable of handling complete supervision of all operations. In reply please submit data covering experience, education, age and salary range. All replies treated confidentially. Address: Box 638, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WORKING FOREMAN

Experienced in green and dry or French sand. False core and architectural experience required. Address: P.O. Box 51, Long Island City 6, New York.

PATTERN SHOP FOREMAN

For medium size shop in Central Indiana. Address: Box 622, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Help Wanted

SALES ENGINEER

A well known, long established foundry and manufacturing concern requires the immediate services of a qualified Sales Engineer. This company presents an unusual opportunity since it is a producer of steel, ductile iron, and engineering grades of gray iron. It also maintains large machine shop facilities. Man must have sales ability and be equipped with proper technical training to call on large users of ferrous castings.

BOX 655, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

WANTED

Experienced cleaning room foreman wanted for gray iron foundry making small castings. Address: Box 658, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CASTINGS SALESMAN

Experienced man under 40 years of age preferred. Salary and expenses. Chicago and some travel. Excellent opportunity for right man with old established steel foundry. Address: Box 653, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Positions Wanted

INVESTMENT CASTING FOUNDRY MANAGER OR SUPERINTENDENT

Young, aggressive, metallurgical engineer presently employed, desires new connection at top management level. Thoroughly experienced in the establishing, managing of foundry, making aircraft quality castings by lost wax, ceramicast and investment "X" processes. Address: Box 637, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MANAGER

Practical and progressive, with 37 years' experience. Nonferrous and ferrous production shops. Well versed in all departments, from the foundry to finished product. Excellent labor relations, bi-lingual (Spanish and English). Now employed. Address: Box 632, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRYMAN

Gray iron. Prefer jobbing or captive shop. Very capable in all phases of the foundry. Casting from small up to ten tons. Twenty years of practical and technical experience. Age: 38, now employed as foundry foreman. Address: Box 652, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

TOP FOUNDRYMAN

Practical experience, early forties. Now producing castings over 40,000 lbs. with CO2. Looking for more action, excellent labor relations. Address: Box 656, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT OR MANAGER

Young foundryman thoroughly versed in all gray iron operations. Degree in Metallurgical Engineering. Interested in responsible position with opportunity. Address: Box 651, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT

Fully qualified progressive foundry superintendent, available to take charge of all foundry operations. Good handler of men, good rigger. Jobbing and captive shop experience. Salary secondary consideration. Address: Box 649, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

GENERAL MANAGER

Nonferrous, all phases including metallurgy. Top qualifications, reputation and references. Desire permanent position with good stable concern. Address: Box 650, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT OR MANAGER

Progressive foundryman familiar with every phase of practical experience on all classes of work. Now employed. Would like to make change. Address: Box 644, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CLASSIFIED ADVERTISING

Positions Wanted

YOUNG FOUNDRYMAN

Twelve years' experience nonferrous and steel. College education, time served apprentice, experience in supervision and stress analysis design, desire position where scope exists for imagination, organizing ability and know-how. Anything considered, full resume to interested parties. Address: Box 643, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MANAGER
SUPERINTENDENT OR SALES

Thirty years' experience in all phases of foundry operations. Malleable or gray iron. Desire to make change. Presently employed as plant superintendent. Address: Box 648, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CHEMIST

Long experience foundry and steel plant materials, ferrous and nonferrous metals. Address: Box 645, FOUNDRY, Penton Bldg. Cleveland 13, Ohio.

Representatives Wanted

MANUFACTURER'S AGENT WANTED

Several exclusive territories open to men with experience in melting practices. An opportunity to make real money selling the nationally advertised REVECON and REVERBALE Furnaces. Leads furnished. Submit details and other lines carried to:

INTERNATIONAL FOUNDRY SUPPLY CO.
BOX 1053
READING, PA.

SALES REPRESENTATIVE WANTED

Large nonferrous sand foundry in jobbing and semi-production work for over 30 years. Interested in commission salesmen in Illinois, Indiana, Wisconsin and Ohio. Send resume of experience.

BOX 598, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

REPRESENTATIVES WANTED

Pneumatic and hydraulic cylinder representatives calling on the foundry trade to represent us for our pneumatic and hydraulic counting devices. Address: PNEUMATICOUNT, 3400 N.E. 54th AVE., PORTLAND 13, OREGON.

REPRESENTATIVES WANTED

Old line supplier to foundry industry is desirous of representation in Chicago, Cleveland, Detroit, Milwaukee, Indianapolis areas for sales of refractory cements. We are leaders in this field. Address: KEYSTONE REFRACTORIES CO., 120 LIBERTY STREET, NEW YORK, NEW YORK.

REPRESENTATIVE WANTED

Gray iron jobbing foundry in Southern Illinois, loose patterns, small rollover, squeezer, bench molding wants representative. Chicago area. Commission basis. Address: Box 657, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Opportunity

PERMANENT MOLD METHOD AVAILABLE THE WAGNER PERMANENT MOLD CO., 2910 Empire Ave., Burbank, California, has developed a Permanent Mold Method for ferrous and nonferrous metals and invites inquiries from any country regarding this method and process.

Employment Service

FOUNDRY PERSONNEL SPECIALISTS

National Placement and Procurement of

GENERAL AND PLANT MANAGERS, PLANT SUPERINTENDENTS, FOREMEN—ALL DEPARTMENTS, METALLURGISTS, ENGINEERS, CONTROLLERS, ACCOUNTANTS, SALESMEN, SALES MANAGERS, PERSONNEL DIRECTORS, PURCHASING AGENTS

Confidential Inquiries Invited
From Employers and Qualified Applicants

For Fast Competent Assistance Contact

DRAKE PERSONNEL, INC. **HARRISON 7-8600**
JOHN COPE, DIRECTOR **220 SOUTH STATE ST., CHICAGO, ILL.**

SALARIED PERSONNEL

$5000-$30,000. This reliable service established 1927, conducts confidential negotiations for high grade men who seek a change of connection under conditions assuring if employed full protection to present position. Send name and address only for details. Personal consultation invited. Address: JIRA THAYER JENNINGS, P.O. BOX 674, MANCHESTER, VERMONT.

Foundry Consultants

SHELL SPECIALIST

Operator Training

Methods and Systems Engineering

Foundry Research & Consulting Service
Box 764, Connellsville, Pa.
MA 8-1890

CONSULTING ENGINEER
Thirty-five years' Experience
Acid and Basic Practice

Improved methods in electric furnace melting. Low cost with high productivity. Avoid expensive mistakes. Acquire consultation prior to the purchasing of your new furnace and in planning, modernizing, and organizing of your melt shop.

EUGENE H. WEAK **2933 HIGHWAY AVE.**
HIGHLAND, IND. **PHONE: TEMPLE 8-1244**

FOUNDRY CONSULTANT—NONFERROUS

Sand — permanent mold — centrifugal permanent mold — and centrifuge permanent mold. High pressure castings a specialty. Address: ED JENKINS, RT. #3, BOX 345, WALKERTON, INDIANA, PHONE: 712W.

Wanted-To-Buy

WANTED

1—33" x 36" pit type heat treating furnace, gas fired, 1650° with full automatic controls.
1—33" x 36" pit type heat treating furnace, electric 1200° plus or minus 5° f. with full automatic controls.

SAVANNAH MACHINE AND FOUNDRY COMPANY
FOUNDRY DIVISION
P.O. BOX 590
SAVANNAH, GEORGIA

WANTED TO BUY

Roots-Connersville Blower

7000-8000 C.F.M. Capacity.

THE EASTERN FOUNDRY CO.
BOYERTOWN, PA.

MIXER WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price or immediate acceptance. Address: Box 578, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WANTED TO BUY

Osborn Rotalift Molding Machines, Handy Sand Units; Pouring devices and monorail system. Address: Box 634, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Foundries For Sale Or Lease

FOUNDRY BUILDING FOR RENT

Gray iron foundry building, 260' x 60' and storage yard, building well ventilated, 66" Cupola, overhead tracks, plus enough foundry equipment in building for quick start in foundry business. Rock Island RR siding. Located in La Salle-Peru, Illinois, urban population 30,000. Will lease for $250 per month.
Inquire at:

M. RAMENOFSKY & SON
LA SALLE, ILLINOIS
PHONE 322

FOR SALE

Going aluminum and brass foundry in North Central Indiana. Three oil furnaces, Wheelabrator molding machine, cut-off saw, automatic core oven, four core blowers. Capable of gross $150,000 to $200,000 per year. Will sell as going foundry or will sell equipment. Owner retiring. Address: Box 647, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY FOR SALE OR RENT

Ready to operate. Equipped for machine molding. Two cupolas lined to 36" and 30". Also well equipped machine shop. Located in South side Virginia in corner of crossing Atlantic and Danville Railroad and main line of Atlantic Coast Line Railroad. One block from U.S. Highway 301 and U.S. Highway 58. Address: BOX 551, EMPORIA, VA.

FOR SALE

Completely equipped modern nonferrous foundry located in Northern Ohio, total floor space under roof 10,000 sq. ft., foundation in for additional 5,000 sq. ft. Land for expansion included. Address: Box 641, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY

Located highly industrialized, Great Lakes area, producing gray, alloy and ductile iron castings for chemical, auto, machinery and machine tool industries. Well equipped for jobbing and semi-production work. Financially strong and excellent earning record. Personal reason for sale by owners. Address: Box 654, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOR SALE

Small aluminum and bronze foundry business in southwestern Pennsylvania. Steady casting for other corporations. Owner retiring. Address: Box 602, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

GRAY IRON FOUNDRY FOR SALE

Small, modern foundry in a southeastern state. Good labor. $12,000 to $16,000 yearly return on $45,000 investment. Call Birmingham, Alabama—Tremont 1-2088 or write to: 3111 Whitehall Road, Birmingham, Alabama.

FOR SALE OR LEASE

Brass, Bronze and Aluminum Foundry. Established 45 years. Metropolitan area. Address: P.O. Box 51, Long Island City 6, New York.

For Sale | For Sale

SACRIFICE SALE

STEEL CASTING PLANT EQUIPMENT

Located at former American Steel Foundry Plant
East St. Louis, Illinois

85—Standard gauge Charging Cars—Standard small couplers
6—25-ton Bottom Pour Ladles
2—Shockless Jolt Strip Molding Machines—16" Cyl. 10,000# cap.
23—Sand Boxes
3—Sand Bins—125 ton, 150 ton, 200 ton
1—Table Type House Blast
1—5 Car Continuous Annealer
4—Single Car Type Heat Treating Furnaces
1—Steam Hammer, 8" x 20"
12—DC Electric Bridge Cranes—5 ton to 35 ton
Air Hoists—Jib Cranes
Steel Shelving—Steel Lockers

Other Equipment—Write for List—Prints Available

Also Modern 17 Acre Plant—A-1 Condition—228,000 sq. ft.
1 Story—Production Space—Offices—Store Rooms—Cafeteria
Machine Shops—Full trackage, Etc.
Located in a Surplus Labor Area.

HYMAN-MICHAELS COMPANY
2039 E. BROADWAY E. ST. LOUIS, ILL. 'Phone: BRIDGE 1-6300

SAND BLAST EQUIPMENT
SELL—BUY—TRADE
GUARANTEED MACHINES
TERMS: 3 YEARS TO PAY

9' LG-14 Pangborn Table	$4500.00
6' LE Pangborn Air Table	800.00
Pangborn 53 EN2 Hand Cabinet	325.00
Pangborn Auto Peening Cabinet	1100.00
48 x 48 Wheelabrator Tumbaist	5000.00
42 x 48 Wheelabrator Tumblast	1500.00
36 x 42 Wheelabrator Tumblast	2000.00
27 x 36 Wheelabrator Tumblast	2750.00
15" Continuous Wheelabrator Tumblast	2000.00
8' Wheelabrator Table Blast	2000.00
6' Wheelabrator Table Blast	3000.00
4' Wheelabrator Table Blast	2500.00
Vapor Blast Cabinets	400.00

All types and sizes of Hand Cabinets, Dust Collectors, Pressure tanks, Rooms, Horizontal or Vertical Tumbling Barrels and additional Sand Blast Equipment too numerous to mention.

DIAMOND SALES, INC.
5654 W. JEFFERSON
DETROIT 9, MICHIGAN
VI-36750
We Will Buy one piece of your entire plant.

FOR SALE

Model "M" 79/60 American Sandcutter purchased new in 1954, in excellent condition. Original cost $6.624.00. Asking price $4,000.00. Address: LAKE ERIE FOUNDRY CO., GIRARD, PENNSYLVANIA.

FOR SALE

Patented portable cast aluminum Bar B.Q. consisting of one six pound and two one pound castings. National sales organization estimates 250,000 yearly unit sales. Will sell for cash plus royalty. Address: Box 640, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SURPLUS EQUIPMENT

1—#7 Whiting cupola, Connersville blower with 30 HP induction motor, Foxboro control, Arcade molding machines, portable, jolt squeeze, Whiting screen type dust collector, Howe platform scales and miscellaneous items. Address: P.O. BOX 54, STATION E, ATLANTA, GEORGIA.

FOR SALE

1—Electro-lift hoist, 6T with power trolley push button control.
5—Chain falls and trolleys, ½ and one ton.
6—Ingersoll Rand air blocks, cable hoists, Model LC5-A-B-BN-D6.
2—Magnetic Pulleys, Eriez and Dings, electro and permanent magnet. Each with counter pulleys and drives available.
Blowers one to five HP, 16 and 32 oz.
Flat belt and troughing conveyor to fit your need.
Flat belt conveyor, 12" wide, 40' long, complete with 1 HP. motor, variable speed drive on stands 42" high, new condition, still on skids.
Dietert Rotap testing sieve shaker, with screens and timer.
Steel City hardness tester, type A, Brinell glass available.
Small tumbling barrel, 3 compartment 18x36 x12 each, octagon shaped, complete gear motor.
Welders, Transformer, MG sets, Hydrogen Atomic, Resistance Type, and spot welders.

FOUNDRY SERVICE & SALES
1719 VICTORIA RD.
CLEVELAND 12, OHIO
KE. 1-9459

FOR SALE

1—Whiting-Mason Cupola Coke Bed Igniter.
1—#2 Sulton Sand Dry Stove.
1—Bellevue Hand Tilt Oil Fired Furnace—Approximately 200# capacity.
1—Redford Cartridge Bench Core Blower with standard cartridge, Size C. Good condition. Purchased 1945.
1—Tinius Olsen Test Machine Transverse #1 with deflection instrument for transverse bars 21" long 5000# capacity.

For Information Contact:
THE PARKERSBURG RIG AND REEL COMPANY
POMEROY WORKS
POMEROY, OHIO
MR. C. E. BRIDER

BLOWERS FOR SALE

Spencer—No. Amer.—Stroman

Capacities from 60 to 4500 CFM at 2, 12, 16 and 24 ounces.

Motors for 110/60, 220/440/3/25 and 60 cycle and 230 volt DC.

Let us quote on your requirements!

R. C. CHELIUS
31 PALMER AVE.
KENMORE, BUFFALO 17, N. Y.

HAVE YOU EVER NOTICED the numerous types of headings under which classified ads are listed? Whether interested in obtaining qualified personnel, selling used machinery, wanting to buy equipment, or are yourself looking for a better position, you should seriously consider advertising in the classified section of FOUNDRY MAGAZINE.

•

FOUNDRY has 75,000 readers which cover the entire foundry industry. That means that for a nominal sum you get the widest possible coverage of the industry and your advertisement reaches "just the right people".

•

The Classified Staff is equipped to handle all details in the placement of your ad.

Classified

ADVERTISING DEPT.
FOUNDRY
CLEVELAND 13, OHIO

CLASSIFIED ADVERTISING

For Sale

CLEARANCE SALE

Carl Mayer Core Oven—48" wide, 32" deep; 51" high	$250.00
Aluminum Melting Furnaces Hand Tilting; 400# cap. each	250.00
500# Aluminum Holding Furnaces ea.	250.00
Model SB-11 International Core Blower	350.00
Model AA American Sandcutter 60" New Blade	250.00

MOLDING MACHINES

213 SPO; 4½" jolt; 13" squeeze
2114 SPO—11" sq.
2136 SPO—13" sq.
720 U Osborn—11" sq.
Tabor—30" x 40"; 12" draw; shockless—1000#
2047 Osborn—18" x 24"; stationary
601—602—606 Osborns
275J Osborn Squeezers

CORE BLOWERS

Redford—Bench Type
#193 and #94 Osborn

FURNACES

2000 lb. Stroman—Tilting Hydraulic
2000 lb. Fisher—Aluminum
350 lb. Detroit Rocker Barrel
Stroman Reverberating—300# Aluminum; 900# Brass cap.

CORE OVENS

Dielectric—Model 900A and 1800 A

MISCELLANEOUS

Jib Cranes—2 ton cap.
U. S. 7½ HP 3 speed grinders; 28" wheel
Model S Screenerators—B & P
#42 Osborn Hand Rollovers
#2 Simpson Mixer—Loader and Aerator—1951

FOR THE BEST DEAL CALL
BALCHER MACHINERY COMPANY
695 E. 152nd STREET
CLEVELAND 10, OHIO
TELEPHONE: GLENVILLE 1-2474

For Sale

WANTED FOR CASH

Turn your surplus new motor inventory into quick cash! Sell your surplus new motors to Ajax Electric Motor Corp.

MOTORS AVAILABLE — NEVER USED

Shipped from stock of over 5,000.
¼ to 200 HP—Special Low Prices.

WRITE, WIRE OR PHONE COLLECT:
AJAX ELECTRIC MOTOR CORP.
P.O. BOX 262, ROCHESTER, N.Y.
LONG DISTANCE PHONE LD. 132

SHELL EQUIPMENT

3—Model CO-1 Shalco shell molders
2—Model HO-4 Shalco shell molders
2—Model MC-3 Shalco shell core blowers
1—Model MCM-5 Shalco shell core blower
2—Model VF-5 Shalco vacuum fusers
1—Model SCM-3 Shallway muller

Equipment taken on trade for new "MASTER" equipment

SHELL EQUIPMENT CO.
PHONE: MARKET 8-1890
CONNELLSVILLE, PA.

WILL TRADE

Foundry equipment for complete operation, including one ton direct arc electric furnace, molding machines, core equipment, sand handling equipment, etc. All equipment dismantled and in storage. Interested in trading for income producing real estate, any location considered.

BOX 629, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

FOR SALE

PANGBORN 14-GK-5 ROCKER BARREL SHOT BLAST MACHINE

Complete with motors and controls. Good operating condition, price $1500.00

NEENAH FOUNDRY COMPANY
NEENAH, WISCONSIN

For Sale

FOR SALE

1 Herman Jolt Stripper 48 x 54
1 Tabor Shockless Jar Rollover, power draw, table 30 x 40, 12" draw, 1000 lb. cap.
3 Tabor shockless jar rollover, power draw, table 22 x 42, 600 lb. cap.
1 Osborn Jolt Rollover, hand clamp, 30 x 40
1 J & J Rollover #918 with rollout table.
1 Int. Rollover Table 30 x 26, 8" draw.
2 Int. Rollovers, Portable
1 Davenport #28 SA Jolt Rollover, Pattern Draw.
2 Champion Model JS-108 Jolt Squeezers
1 Int. Plain Jolt 36 x 48
3 Milwaukee Squeezers, Stationary
2 Int. Squeezers, Portable
1 Nichols Plain Molding Machine, High Speed.
6 Arcade Model 100S Jolt Squeezers, Stationary
1 Int. Core Blower, SB 13
1 Int. Core Blower, SB 11
1 Champion Core Blower, CB 18
1 Demmler Core Blower, Style 1
1 Demmler Core Blower, Style 2
2 Porbeck Core Ovens, 6½' x 6½' x 9', raising door
2 Core Ovens, Drawer type (and walk in type)
2 Simplicity Screenarators
2 Sand Mixers, paddle type
Pouring devices up to 2,000 lb.
5 Pouring Ladles, cylindrical, 26 x 28, geared Gyratory Riddles
Monorail and Bridges
Air Hoists, 500 to 4000 pounds, used
Air Hoists, 2000 lbs and 4000 pounds, never used, still in original crates. Big Savings
1 Chain Conveyor #458, Trolleys and Drives.
Dust Collectors, all sizes
Blowers, all sizes, Pressure & Exhaust.

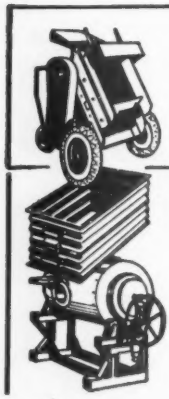
FLASKS—THOUSANDS IN STOCK, ALL SIZES

MANY OTHER ITEMS IN STOCK
SEND US YOUR INQUIRIES
WE BUY — SELL — TRADE

HOMAN MACHINERY CO.
710 E. FRONT ST.
CINCINNATI, OHIO
MAin 1-0339

FOR SALE

#242 Osborn Rollover Molding Machine with end roll off. Machine has not been used since overhauling by Osborn Company. Address: KENDALLVILLE FOUNDRY DIV., KENDALLVILLE, INDIANA. Phone #11.



EUCLID FOUNDRY & MACHINE EQUIPMENT CO.

14919 SARANAC ROAD **CLEVELAND 10, OHIO**

OSBORN ROLLOVERS:

5—405, 18" to 26" draw, air clamps, 3500# capacity

TUMBLING MILLS:

1—60" x 72" Ransohoff wet type 220/440/3/60
1—36" x 54" Royersford, belt driven
2—32" x 68" & 50" x 80" Sly

WHEELABRATORS

1—36" x 42" 11½ cu ft. with loader
1—48" x 42" 17½ cu ft. with loader

MULLERS

2—610 Clearfield 14 cu ft. capacity
1—3 Simpson 30 cu ft. capacity

SWING GRINDERS

10—10 H.P. Mummert-Dixon Model 1814
3—25 H.P. Safety Grinding Wheel Model 204

ELECTRIC FURNACES:

1—250 lbs. Detroit Rocking
1—350 lbs. Detroit Rocking

ASK FOR OUR COMPLETE LISTING — GLENVILLE 1-1222

CLASSIFIED ADVERTISING

For Sale

REPAIR AND REBUILDING SERVICE ON ALL PNEUMATIC TOOLS

We try to keep on hand a stock of **"Hard Chrome Rebuilt Foundry Tools"** such as Rammers, Chipping Hammers and Core Breakers. Our prices are about **One-half** the cost of new tools. All tools sold by us are guaranteed and can be returned if not found satisfactory.

CENTRAL PNEUMATIC SERVICE COMPANY
512 LINDEN AVENUE
DAYTON 3, OHIO

FOR SALE

1—Wheelabrator 27" x 36", iron belt and loader
1—Wheelabrator 42" x 48" with loader
1—Wheelabrator 4 ft. table
Small and large hand blast cabinets, Ruemelin and Pangborn.

F. D. RICHARDSON & CO.
14800 GREENFIELD ST.
DETROIT, MICHIGAN
Phone: BR 3-9124

FOR SALE
MOTORS—GENERATORS
TRANSFORMERS
Unused — Rebuilt
WORLD'S LARGEST INVENTORY
ELECTRIC EQUIPMENT COMPANY
Phone Station Collect GLenwood 3-6783
P.O. Box 51—Rochester 1, New York

For Sale

SPRUE CUTTER

Ferracute, 40 ton pressure, 100 strokes per min., open HT. 9½" 1½" stroke. Equipped with 5 H.P. 550 volt motor, almost new, not suitable for our type of castings.

ALSO
Stroman Skienar Furnace
500 lb. Capacity—Excellent Condition

NEPTUNE METERS LIMITED
1430 LAKESHORE ROAD
TORONTO 14, ONTARIO
CLIFFORD 9-4211

BAR STOCK PATTERNS

208 Wood patterns, excellent condition. For rectangular, square and round cast iron bar stock. These patterns will produce a size range from ⅝" x 2½" x 18" to 8" x 10" x 48" and to 12½" diameter x 8⅝" long. 196 of these mounted for machine production.

MARION MACHINE FOUNDRY, INC.
MARION, INDIANA
PHONE 412

FOR SALE

Speedmuller Model 30 B & P, completely rebuilt. Excellent condition, just replaced by larger unit. Priced to sell. Address: EAGLE IRON WORKS, BOX 934, DES MOINES, IOWA.

FURNACES FOR SALE

Ten used heat treating furnaces and two 7-ton gantry cranes. Good condition, priced to sell. Address: BAER STEEL PRODUCTS, INC., BOX 1428, BOISE, IDAHO.

MOLDING MACHINE

Herman 6000# capacity, jolt-roll-draw in operating condition. Asking $2900 f.o.b. Address: POTTSTOWN MACHINE CO., POTTSTOWN, PA. (Phone 37, H. H. Houston).

For Sale

DUST COLLECTORS

1—ROTOCLONE, TYPE N—35000 CFM
1—ROTOCLONE, TYPE N—30000 CFM
1—ROTOCLONE, TYPE N—22000 CFM
1—ROTOCLONE, TYPE N—20000 CFM

SPECIAL

1—NATIONAL ENGINEERING SAND RECLAMATION SYSTEM—2 tons/hr. Used 1 year—BARGAIN

1—20 x 27 Rubber Belt WHEELABRATOR TUMBLAST with Dust Collector.

1—36 x 42 WHEELABRATOR TUMBLAST with skip loader and Dust Collector.

Everything Is Late Model

Call Us Collect For All Your Requirements

WHITEHEAD EQUIPMENT CORP.
P.O. Box 939 READING, PA.
PHONE: FRanklin 5-4379

NOW LIQUIDATING

A Complete Modern Electric Furnace Foundry—Formerly Property of CLOVER FOUNDRY, Muskegon, Michigan

3—Pittsburgh Moore Lectromelt Furnaces
  1—Size Q 6000# per hour
  2—Size S 2000# per hour
3—Detroit Electric Furnaces—350# & 750# per hour
8 Station Newaygo Molders Hopper Line—53' overhead belt
2—20" x 22' Spill Sand Conveyors w/hoppers
4—Simplicity 3 x 5 Shakeouts
1—20" x 125' return Sand Conveyor
1—16" Bucket Elevator 32' centers
1—16" Bucket Elevator 28' centers
1—16" Bucket Elevator 25' centers
1—18" x 125' Flat Belt Conveyor
2—50 Ton Sand Hoppers
1—Link Belt 3' x 8' Double Deck Screen
Magnetic Pulley

SIMPSON 3K Muller, cap. 3000# batches, w/skip, air operated double discharge, Wheelco temperature recorder, dust hood, air operated bond hopper, cooling fan, New 1955.

Newaygo Aerator
Lowden Electrified Pouring System (New Nov. 1954) Cost $87,000. 552 feet-electrified rail switches
9—Yale Motoveyors—2 ton capacity
3—6000# Industrial Ladles geared covered
8—2125# Industrial Ladles geared covered
10—Ladle Heaters
3—Wheelabrators
  1—48" x 48" with loader
  1—36" x 42" w/bucket loader
  1—20" x 27"—rubber belt type
1—36" x 72" Whiting Tumbling Mill
1—85M. Milwaukee Sprue Cutter
1—Besley 226 Double End Disc Grinder 30" x 2" x 14"
1—Besley #8 Single End Disc Grinder—20" wheel
1—Gardner 122 Single End Disc Grinder—20" wheel
7—Cincinnati #2 Centerless Grinders
2—Cincinnati #3 Centerless Grinders
3—Feedall Feeders
4—Osborn 712 PV Vibra Squeeze Double Swinging Head Machines—6" pin lift
1—Osborn 716 PV Single Swing Head
2—Tabor 12" Cylinder Pin Lifts
3000—12" x 18" x 3" Sterling flasks
Ingersoll Rand 75 HP Synchronous Compresor
2—Parsons Dust Collectors—45,000 cfm and 20,000 cfm
50—Electric Hoists—500# to 5 ton—Yale and Budgit makes
10—Fairbanks Platform Dial Type Scales—1000# to 6250# includes
  3—weigh count scales up to 3200#
5—Clark Lift Trucks—4000# & 5000# cap.
2—G.M.C. 1955 Trucks
Sand Laboratory
Optical Pyrometers—L. & N. and Pyro

Arlin Automatic Rockwell Tester Model 823 for automatic production testing of small parts up to 1¼" diameter—Cost 1955 $14,000.

2—South Bend 14½"—16" Tool Room Lathes
#2H Plain Milwaukee Mill
24" Cincinnati B. G. Shaper
Delta Toolmakers Grinder
L. & N. Vapo Carb Heat Treating Furnace—automatic controls—3.7 KW—1600°
5—Wilson Setomatic Rockwell Testers
Office Equipment, Desks, Adding Machines, Calculators, Bookkeeping Machines, Typewriters, 20 Steel Desks, Chairs.
Foundry Supplies & Equipment
Spare Parts for all above equipment

50 000 sq foot Sprinkled Foundry Building
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AIR COMPRESSORS

1—CHICAGO PNEU., 160 CFM, 30 HP.

AIR & ELECTRIC HOISTS

85—INGERSOLL RAND Air Hoists, Sizes RC-5, A, B, C, D, ¼, ½, 1, 2 ton.
15—DETROIT Air Hoists, 1 & 1½ ton cap.
15—APPLETON Air Hose Reels.
2—P&H and DETROIT Model LHR, 5 ton.
20—THOR air hoists, ½, 1 & 2 ton cap.

BUCKET ELEVATORS

2—LINK BELT 35 ft. & 50 ft., 12" x 7" Buckets.
2—NATIONAL 45' & 50', 10" x 7" & 14" x 7" Buckets.

CUT-OFF MACHINES

1—DeWALT ME2, 10 HP, 24" Blade.
1—GROB Band Saw, Type OS-36.
3—TESSEMER H & I Sprue Cutters.

CORE BLOWERS

3—CHAMPION Model CB-10, CB-18, & CB-400. From 10 to 300 lb. Cores.
22—DEMMLERS Model Nos. 1, 1E, 2, 2E, 2K, 3, 3E, 3K, 4, & 4E. From 10 to 100 lb. Cores.
7—INTERNATIONAL Model SB-11 & SB-13. SB-15H, 15 to 30 lb. Cores.
6—OSBORN Nos. 91, 192, & 193. From 10 lb. to 75 lb. Cores.
3—REDFORD & MILWAUKEE Bench.
1—SPO Model SC-10-DM Shell Core Blower

CORE OVENS

4—CARL MAYER 2-Compartment, gas fired, I.D. 7' W x 14' deep x 8' H each.
1—INDUSTRIAL "Revolving Carriers" continuous, 18" x 80" trays.
2—PORBECK Model C-3-C, Double Drawer Type. Gas fired, new in 1955.

CUPOLA BLOWERS & EQUIP.

1—SPENCER 150 HP 7500 CFM 48 oz.
6—I & R Centrifugal 30, 50, 85 and 100 HP, 3500 to 10,500 CFM w/blast gates & controllers.
1—ROOTS 7,000 CFM, 50 HP motor.
14—LINDBERGS. From 1 HP to 15 HP, 160 to 2100 CFM.
1—MODERN No. 3½ Cupola
1—CUPOLA Bondactor Machine, style 1250-L

ROTO-CLONES WET TYPE

9—AMERICAN AIR FILTER Type N&W, Sizes No. 10, 14, 20, 24, 27, & No. 30, w/sludge ejectors, cap. to 30,000 CFM.

ELECTRIC MELTING FURNACES

1—AJAX 20 KW Induction Unit.
1—TOCCO 20 KW Induction Unit.
3—AJAX No. 300 & 500 Furnaces Only.
1—BOOTH one ton, direct arc, side charge with 1500 KVA Transformer with gear and all controls.

GAS & OIL FIRED FURNACES

23—LINDBERG FISHER Model MNP Electric Tilting. Sizes 150, 300, 400, 600, 1700, 2000 & 2400#, aluminum capacities, Gas or Oil Fired.
5—LINDBERG FISHER Type BBI Hand Tilting Furnaces, Sizes 100, 125, 225, & 1000. Oil Fired.
29—LINDBERG FISHER & CAMPBELL HAUSFELD Stationary, Sizes 100, 150, 200, & 550 capacity. Gas or Oil Fired.

HEAT TREAT FURNACES

1—DESPATCH Model DT-26, 38" diameter x 26" height, gas fired recirculating, 1250°, pit type

GRINDERS

Swing Frame

1—MARSCHKE 20" x 10" wheel, 10 HP.
2—FOX No. 6, 24" x 10", 15 HP.
3—MARSCHKE 24" x 3" wheel, 15 HP.

Snagging

2—U.S. #64, 20" x 3" wheel 7½ HP.
2—SAFETY #174, 24" x 3" wheel 10 HP.
2—MARSCHKE 24" x 4" wheel, 20 HP.

Disc

1—QUEEN CITY Model 100 20" x 2" wheel.
1—U.S. #80, 16" x 3" wheel, 7½ HP.

Core

2—MILWAUKEE 70-12, 70" dia. table.
1—STONEY Core Grinder, 16" dia. Wheel.

LADLES

17—MODERN & WHITING Cylindrical Ladles, 275, 1500, 2450, & 3000 lbs. capacity. All Enclosed Gears.
12—MODERN Model F-9 and FA-9 Pouring Devices, with ladles 400 to 800 lbs.
37—MODERN & WHITING Lip Pour, Enclosed Gear, 1200, 1600, 2000, 4000, 6000, 7000, 8000, & 80,000 lbs. capacity.
7—MODERN & WHITING Cylindrical Mixing Ladles. 2 & 3 ton capacities. Electric & Manual Tilting.
7—WHITING Bottom Pour 4 ton.

MOLDING MACHINES

Jolt Squeezers

37—OSBORN, SPO, MILWAUKEE, Portable & Stationary. 10" Squeeze Cyl.
13—OSBORN, MILWAUKEE & SPO Portable & Stationary, 12" Cylinder.
6—MILWAUKEE 18" Cyl., 24" x 36" Table.

Plain Jolt

1—HERMAN 40" x 70" table, 6000# cap.
1—HERMAN 40" x 58" table, 6000# cap.
1—DAVENPORT 24AJ, 24" x 30" table.
1—HERMAN 8' x 12' table, 32,000# cap.

Jolt Rollover Pattern Draw

1—DAVENPORT 28-SA, 29" x 40" table.
2—DAVENPORT 40-SA, 42" x 50" table.
1—HERMAN 6000 lb. Series, 42" x 78".
3—HERMAN 1500 lb. Series, 26" x 48".
1—HERMAN 750 lb. Series, 20" x 30".
2—HERMAN 4000 lb. Series, 40" x 60".
14—INTERNATIONAL Type G, Table Sizes 20" x 8", 24" x 10", 30" x 12".
1—INTERNATIONAL RES Size 15" x 8".
2—J & J #612, 24" x 30" Table.
4—J & J #918, 44" x 54" Table.
1—J & J #815-B, 30" x 40" Table.
1—MILWAUKEE #167, 32" x 33" Table.
1—MILWAUKEE #60B-3, 60" Flask.
10—OSBORN #40 and 42 Core Rollovers.
1—OSBORN #442, 21" x 31" Table.
2—OSBORN #242W, 29" x 42" Table.
12—OSBORN #601 & 602, 30" & 36" Wide Flask, 10" Draw, 750 lbs. Cap.
1—SPO #413D, 24" x 25" Table.
1—SPO Model 9336, table size 22" x 28".
1—SPO Model 508, table size 28" x 30".
3—TABOR 30" x 40" Table. 12" Draw.
4—TABOR 22" x 32" Table, 10" Draw.

Jolt Pin Lift

2—DAVENPORT 24-AJS, 24" x 30" Table.
2—OSBORN #559, 25" x 30" Table.
1—OSBORN #560, 32" x 45" Table.
1—OSBORN #563, 55" x 63" Table.
2—MILWAUKEE #2542, 38" x 42" Table.
1—SPO #3058, 22" x 28" Table.
1—SPO #3102—42" x 50" Table.

Pin Lift

9—INTERNATIONAL & B & P Speed Draw Machines. Used with Sand Slinger. Capacity from 600 to 2000 lbs., up to 30" x 40" flasks.

Jolt Squeeze Pin Lift

1—MILWAUKEE #125, 21" x 27" Table.
3—MILWAUKEE #165, 24" x 30" Table.
1—OSBORN #712-V, 18" x 26" Table.
2—OSBORN #710-J, 17" x 21" Table.
4—INTERNATIONAL PKL, 17" x 26" Table.
1—SPO #2114, 20" x 27" Table.
2—SPO #2136-G, 19" x 27" Table.
1—SPO #2146, 21" x 27" Table.

MATERIAL HANDLING EQUIPMENT

1—EC&M 45" dia. Type SA, Magnet.
3—HOUGH Model HA Payloader, hyd.
1—BLAW-KNOX ½ yd. Bucket.

CONVEYORS

Steel Apron

9—JEFFREY & LINK BELT 24", 30", 36", 42", & 48" Widths. Length built to your specifications, with reducers & motors to your speed requirements.

Oscillating

3—SIMPLICITY Model OA-10-A, 36" x 15'.
1—LINK BELT 48" x 154', 20 HP Motor.
4—LINK BELT 30" W x 45', 65' & 80' lengths.
1—ROBINS Vibra-Veyor 24" W x 100' long x 8" deep pan, New 1953, like new.
7—JEFFREY TAYLOR No. 5 Vibrating Feeders 24" wide x 7' long, total unit 24" W x 49' long, w/MG set. New 1949.

Roller

2500' MATHEWS 6", 10", 20", 22", 24" & 30" wide. Heavy duty, 2 9/16" dia. roller, 11/16" hex shaft on 3" x 4" centers. Mounted above rail on 4" channel iron.
500' MATHEWS 12" & 36" wide, heavy duty, 3½" dia. roller, 1" hex shaft on 6" centers, 6" channel iron sides.

Mold

1—LINK BELT 36 cars 4' x 5', 190' track, with automatic dump. New 1952.
3—LINK BELT 88 Cars 20" x 48", 350' track, with automatic dumping.

Belt

LINK BELT & JEFFREY 18", 24" & 30" wide. Flat or trough idlers, all Timken bearings. Built to your specifications. Can be equipped with molders hoppers & ploughs.

MOLDERS HOPPERS & STORAGE BINS

7—NATIONAL & LINK BELT Storage Bins. 60 to 150 tons cap.
42—MOLDERS Hoppers 1½ ton cap.

SAND MULLERS

1—B & P No. 60 Speed Muller.
1—B & P #7 Mulbaro, 700 lb. cap.
2—B & P #70 Air Cooled, Speed Muller.
1—BAKER PERKINS #16½, 30 HP.
2—CLEARFIELD No. 610 w/skip hoist loaders, 10 to 14 cu. ft. batch.
1—DRAVO-DOYLE 6 cu. ft cap. Port.
1—LINK BELT 48" x 8' Paddle Type.
2—SIMPSON #1 Style B, 400 lb.
3—SIMPSON #3 Style C, 3000 lb.
1—SIMPSON #2 Style C. 1500 lb.
3—SIMPSON #3 Style UD, 3000 lb.
1—SIMPSON #0 Style B, 175 lb.
1—SIMPSON #1 Style UD, 500 lb.
1—SIMPSON #1½ Style UD w/loader.
1—Mixer Muller, 6 cu. ft. capacity, paddle type.

SAND PREPARATORS

2—NATIONAL #3 Style C Aerators.
6—ROYER Complete conditioning units including Shakeout, Belt Conveyor and Sand Blender.
6—B & P Screenerators, Models S, M & L.
8—ROYER Models, NC-4, NDS, NDP.
6—AMERICAN Sand Cutters, Model M, Sizes 79/60, 89/70, 99/80. All late.
4—AMERICAN Model AA and AM, 45" & 60" Cutting Blade.

SANDSLINGERS

1—B & P Motive Jr., 300 cu. ft. tank.
2—B & P Tractor Type 19" head & 16" head, 13' arms. Magnetic towers.
6—B & P Models DB Stationary Sand Slingers, 16", 19" and 22" heads, with 20, 25, 40 and 50 HP motors. All late.
2—B & P Swing Type Slingers 19" head.
1—B & P 2 ton plate feeder.
4—B & P 8 ton plate feeders.
2—B & P 20 ton capacity plate feeders.
2—B & P 35 ton capacity plate feeders.

SHAKEOUTS & SCREENS

2—LINK BELT 5' x 10', 6 ton cap.
1—SIMPLICITY 3' x 5' Model B, 5000#.
1—ROBBINS 8' x 10' Model JF-11 Dual, 16 tons per unit.
1—SIMPLICITY 4' x 10', Model D.
1—SIMPLICITY 6' x 8', Model DE.
1—SIMPLICITY 5' x 8', Model D.
1—NATIONAL ENG. 5' x 8' Hex Screen.
1—HEWITT-ROBINS 36" x 78" Vibrex.
1—SIMPLICITY 4' x 10' Model B, single deck sifter screen, 10 HP motors.
1—HEWITT - ROBINS Vibra - Feeder 30" wide x 60" long.
1—SIMPLICITY 4' x 6' Model B.

SAND BLAST EQUIPMENT

1—AMERICAN No. 1-B Suction Cabinet.
1—AMERICAN #3 Tablast, 4—48" tables.
1—AMERICAN #1 Tablast, 7—14" tables.
2—AMERICAN 36" x 42", w/Skip Hoist.
2—AMERICAN 48" x 42", w/Skip Hoist.
1—PANGBORN #45, type MT Sand Blast Room, 10' L x 8" W x 6' H, w/8" dia. Rotating Table.
1—PANGBORN No. 53, type EN-2 blast cabinet with dust collector
1—PANGBORN Model 6-LF. 6' diameter plain table with dust collector.

TUMBLING BARRELS

13—SLY & WHITING. All late type units, with gearhead motors and built in magnetic brake, Timken bearings. Following sizes 30" x 60", 36" x 84", 42" x 72", 48" x 72", 48" x 96", 72" x 120".

AAA MACHINERY & EQUIPMENT CO.

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THE ACME BARGAIN PAGE

BLOWERS

Ingersoll-Rand Type FS. Single Stage 4000 CFM @ 3.75 PSI, 100 HP, 220V G. E. Induction motor. General Electric 7500 CFM, 20 oz., 89.6 Max. HP, 220V motor, Airway controls.
Ingersoll-Rand turbo compressor 10500 CFM @ 20 oz. 85 HP G. E. 220V 3500 CFM motor.
1—Whiting-Allis Chalmers Turbo, 5750 CFM 28 oz. 60 HP 440V air pressure Controls.

CONVEYORS, VIBRATING

36" x 162' Oscillating Pan Link Belt
30" x 53' Oscillating Pan Link Belt

CORE BLOWERS

3—International SB 12.
4—International SB 13.
6—Osborn 193.
1—Osborn 2035-2.
1—Champion CB 400.
1—Champion CB 15.
2—CB 10 Late Type.
1—3E Demmler Drop Away Draw.
1—No. 4 Demmler.
1—Redford Bench Type.

CORE GRINDERS

5—Milwaukee 70-9.
1—Owasso #DE-1.

CORE OVENS

Despatch Type S, 2 cars 27½ x 54 x 64, Gas Fired.
2—Thermonic 900A-1800A.

CORE OVEN VERTICAL HORIZONTAL

1—Coleman, combination oil or gas fired 43 carriers 24" x 90" —1 hour 12 min. to 4 hours 48 min. cycle.
1—Coleman combination oil or gas fired 43—2 shelf carriers 30" x 144" long. 2 hour 12 min. to 7 hour 24 min. cycle. Present replacement cost over $90,000.

CORE PASTE OVENS

2—Coleman Gas Fired 28'-25" x 42" opening.

NORMALIZING OVEN

Despatch DT 36 Electric—Pit type, 42" x 40" baskets, 220V.

DUST COLLECTORS

Rotoclone 24W, 30 HP.

ELECTRIC CRANE & RUNWAY

270' x 50' Crane Runway with A Frame supports and 2 cranes.
1—P & H 5 Ton OET Crane, 3 motor, 115V D.C., outdoor type, 45' lift with reel for magnet or bucket service.
1—P & H 3 Ton OET Crane, 3 motor, 115V D.C., outdoor type, 45' lift with reel for magnet or bucket service.

ELECTRIC MELTING FURNACES

Detroit Electric 1500#—Kuhlman 13200 volt transformer complete with controls.
Detroit Electric 350#—Kuhlman 13200 volt transformer and controls.
Detroit 350#-750# shells 2300V Primary, Complete with controls.

FURNACE TRANSFORMERS

We have Electric Furnace Transformers in stock from 800 KVA to 2500 KVA. Write us your needs.

FURNACES, ALUMINUM-BRASS

Stroman 1000# hydraulic Tilt-oil.
Stroman 300-400# hand tilt oil-gas.
Eclipse 100# RB stationary gas.
Stroman 350#.
Fisher 1000# BBI Manual Nose Pour.
Lindberg 500# ASM 600.

GRINDERS, SNAGGING

2—Hammond 10 WRI D. E. Snag. 20" dia. wheels, 10 HP 220/440 v motors, variable speed drives.
1—3" x 24" U.S. #65, 20 HP 220/440V.
1—7½ HP Hammond D. E. Snag Grinder.

GRINDERS, SWING FRAME

1—3" x 24" x 12" Marschke, 20 HP.
1—3" x 24" x 12" U.S. 15 HP.
1—2½" x 20" x 6" U.S., 10 H.P.

HOT METAL CARRIERS

3—1 ton D.C. Cab operated Cleveland, Monotractor Hot Metal Carriers.

LADLES

2000# Whiting Jr. & Car.
5000# Modern Geared.

MOLDING MACHINES

Jolt Squeezers:
1—Milwaukee 103-11 Staty. Jolt Squeezer, 13½" x 20" table.
7—Champion JS10P Portable Jolt Squeeze molding machine, 18" x 21" table.
1—Osborn 275J.
1—Taccone Model TD4, high production diaphragm molding machine.
2—Milwaukee 104-5 Staty. Jolt Squeezers.

Jolt Squeeze Pin Lifts:
6—712 PJ Osborn, 18" x 28" table.

ROLLOVERS

1—Herman 4000# Series 30" x 60" table.
1—Herman 3000# Series 40" x 84" table, special slotted table.
1—Herman 1500# Series 20" x 36" table.
2—Herman 750# Series 20" x 30" table.
2—Herman 750# Series 20" x 24" table.
3—SPO Model 9032.
1—Milwaukee 217, 22" x 42" table.
2—International Type G, Portable, 20" x 8" draw.
3—Tabor Portable Rollover 30".
Johnston & Jennings 1020-44 x 44 max. Flask Size.
Osborn #405 20" x 60" table.

PIN LIFT PUSHOFFS

1—Champion Pin Pushoff 28" x 42" table 10" draw.
2—Milwaukee 620 ND-20" x 24" table.

MULLERS

Simpson #1H.
Simpson #2 Unit drive with skip hoist.
Simpson #2 Unit drive.
#70 B & P modern cross head, rebuilt.

OVERHEAD TROLLEY CONVEYORS

2000' Jervis B. Webb & Link Belt 678 chain, 4 D.C. motor drive and MG set.

POURING DEVICES

3—Pouring devices, Whiting 500#.

SHAKEOUTS

Link Belt 5' x 10'—7½ HP motor.

SPRUE CUTTERS

2—Perkins #53.

STRAIGHTENING PRESS

150 Ton Dual Ram Dennison C Frame Hydraulic, 30" x 108" table.
50 Ton Oil Gear C Frame Hydraulic, 30" x 40" table.

TUMBLING BARRELS

3—Royersford 42' x 72' Roller Bearing, Chain Drive.
1—Sly Square 42 x 42 x 64.
1—Sly 42" Dia. x 56".

WIRE STRAIGHTENERS

Climax 2A.

WHEELABRATORS

48" x 42" American, bucket loader.

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UNIVERSAL REBUILT EQUIPMENT GUARANTEED

AIR COMPRESSORS

COMPLETE STOCK—BURY, PENNSYLVANIA, SULLIVAN, INGERSOLL-RAND —SEND YOUR REQUIREMENTS

BLOWERS

25—CENTRIFUGAL 16 oz., 2 to 5 HP
10—GE, WILBRAHAM-GREEN, FISHER Positive Pressure and Cent. Cupola Blowers

CLEANING EQUIPMENT & TUMBLING BARRELS

1—AMERICAN WHEELABRATOR TUMBLAST, 48" x 48" w/loader used 9 Mos.
1—AMERICAN WHEELABRATOR TUMBLAST, 42" x 48" w/loader
1—15" Continuous AMERICAN TUMBLAST, 4 tons per hour capacity
1—AMERICAN WHEELABRATOR, 36", Continuous Side Discharge, Two Head, Serial #A95643, New 1953, Used 2 Months
1—PANGBORN TABLAST, 8' Table
3—TANNEWITZ METAL CUTTING BANDSAWS, 30" and 42"
4—BURRING BENCHES, Magnesium cleaning, 9' L x 30" H x 30" W
1—AMERICAN #1 MULTITABLE TABLAST, 17" Table
10—WHITING 36" x 36" x 72" w/gear head motors & brakes
1—WHITING 36" x 72" Round w/gear head motors & brakes
1—SLY, Twin Unit, 40" x 24" Round, 10 HP
1—SLY, 68" x 32" Round

CONVEYORS

1—LINK BELT, vibrating, double deck, 80' x 24", w/exhaust hood
1—LINK BELT, CAR type mold, 114 cars, 403' track, car size 18" x 42"
2—LINK BELT, 30" Steel Apron Conveyors, 100' Centers
1—JEFFERY, 3 compartment, ingot mold
4—SAND ELEVATORS, Various sizes
6—SAND BELTS, 10' ctrs. to 140' ctrs.
2500 FEET—FOUNDRY TYPE ROLLER CONVEYOR—ALL SIZES

CORE BLOWERS

1—CHAMPION CB-12
3—INTERNATIONAL SB-13
12—DEMMLER #1, #2, #2A, #2K, #3K, #4E, #55
4—OSBORN, #91, #92, #192, #91-10
1—TACCONE #4D, 10" Draw Stroke Cyl.

CUPOLAS

1—MORRIS #9, Skip charger, Blower, Mixing Ladle, Never Installed
1—SKIP CHARGER for #9 Cupola with scale and buckets
2—TABOR Cupolettes, 48" dia, 9" cap.
1—WHITING Skip Charger for #5 Cupola
1—WHITING #4, w/charger & blower, Foxboro Control
1—WHITING #7 w/Skip Charger, Blower, and Foxboro Control

DUST COLLECTORS

9—ROTOCLONE #12 Type N, #14D, #16W, #20D, Type W 30"

FLASKS

150 HINES AND FREEMAN ALUMINUM, Popoffs and Jackets
200 TRANSITE CORE PLATES, Various sizes
SEND US YOUR REQUIREMENTS

FURNACES—DIRECT ARC MELTING

1—250 Lb. LECTROMELT, Side Charge
1—3,000 #/hr. LECTROMELT
1—2 ton LECTROMELT
1—6 Ton HEROULT

FURNACES—INDIRECT ARC

1—350 #/hr. DETROIT, Complete
1—1500 # DETROIT ROCKER, Complete
1—3000 # DETROIT ROCKER, Complete

FURNACES—INDUCTION MELTING

1—1 ton AJAX
1—3 KW, AJAX, Lab type
1—20 KW, AJAX SPARK GAP, High Frequency
1—20 KW AJAX, 50 # capacity

TO BE SOLD AT ANY PRICE GIVE US AN OFFER

Pangborn Continuous Shot Blast Machine

REPLACEMENT COST *OVER* $75,000.

5 Wheel Type each wheel driven by 20 Hp AC Motor. Pendulum type #458 chain conveyor for pick up and return, w/motor driven screw type conveyor for shot return to bucket elevator. Complete w/all controls and switches. Serial 51997391. Large lot of new spare parts.

CALL US COLLECT TODAY!

FURNACES—GAS & OIL

1—FISHER MNP, Gas, Tilting, 1700 # cap. Mag.
2—FISHER, Gas, Stationary, 4 Burner, 500 # cap.
1—FISHER MNP, Oil, Tilting, with blower, 500 # cap. Alum.
1—FISHER MNP, Oil, with blower, 1500 # cap. Brass
1—HAUSFELD, Tilting, 1200 # capacity
1—STROMAN, Gas, Tilting, 1000 # cap. Alum., auto control hyd. lift
1—REDA 550 #. Never Used

GRINDERS

1—GARDNER 12" x 2½" wheels, 5 HP
1—HISEY WOLF, Model 4, 16" x 2" wheels, 7½ HP
3—U.S. Model 64, 14" x 2" wheels, 5 HP
1—U.S. Model 66, 14" x 3" wheels, 7½ HP
1—U.S. Model 65, 20" x 3" wheels, 10 HP Swing Frame
1—MUMMERT DIXON, 16" x 2" wheels, 7½ HP
4—22" wheels, 10 or 15 HP
1—CINCINNATI, 5 HP, 2/60/110

MOLDING MACHINES

Core Rollovers

1—INTERNATIONAL, Type AN, 3500 # Cap., 40" x 20" Table

Jolt Rollover Pattern Draw

2—J & J #918, 44 x 54 Table, 20" draw
2—J & J #815, 30" x 40", 15" draw, 1200 # jolt
2—INTERNATIONAL, 13" x 17" table, 6" draw
1—HERMAN 10,000 #, 48" x 109" table
1—HERMAN 6000 #, 50" x 72"
1—HERMAN 3000 #, 30" x 66" Table
2—HERMAN 1500 #
1—HERMAN 750 #, 30" x 36"
2—OSBORN #602, 36" x 26", 900 #
1—OSBORN #405, 3000 #, flask size 64" x 50", 18" draw
3—OSBORN #42, 15" x 20", hand draw
4—TABOR 40" x 60", 1500 & 3000 # capacity
1—TABOR, 30" x 40" w/air clamps, 1000 #
3—TABOR 22" x 42", pattern draw, shockless, portable
1—TABOR, 20" x 30" w/air clamps, 1000 #
1—TABOR, 14" x 16" Rockover

Bumpers

1—OSBORN #102
2—DAVENPORT, Table sizes 24" x 27", 30" x 30"

Jolt Pin Lift

1—J & J #681-C, 30" x 25" table, 600 # cap.
2—SPO #305, 20" x 27" table, 750 # cap.
1—HERMAN, 22" x 30" table, #4317
1—TABOR, 17" x 20" table, portable
1—TABOR, 20" x 20" table, hand strip
1—TABOR, 20" x 24" table, 600 #
1—MILWAUKEE #1536, 32" x 38", 1500 #
1—OSBORN #559, 25" x 30" table, 6" draw, 1200 #

Jolt Squeeze Pin Lift

1—MILWAUKEE #126, 21" x 27" table, 12" sq., 1200 #
2—MILWAUKEE #163 15" x 24" table, 11" sq.
2—OSBORN #712, 18" x 28" table, 12" sq.
4—SPO #2114P, 21" x 27" table
1—SPO #2136G, 21" x 30" table

Jolt Squeezers

2—MILWAUKEE #104-5JS, 17" x 21", port.
3—SPO #110J, 17" x 20" table, 10" sq.
4—INTERNATIONAL #10 LJS, 17" x 20"
2—INTERNATIONAL, #12 LJS, 17" x 20" table, stationary and portable
6—TABOR, 3" Jolt, 17 x 20"
1—NICHOLS #12 F-P, portable, 600 #
12—OSBORN #275J, #275PJ, 16" x 20" tables, 10" sq., 400 #
2—INTERNATIONAL, PKL, 18" x 24" table, 12" sq.

MATERIAL HANDLING

1—BYERS, Mobile Crane, BUDA Engine, 50' Boom, 5 ton w/magnet & bucket
1—Electric Magnet, 47" x 47", 20" deep
1—CLARK, Fork Lift, Gas, 3000 lb. capacity, Solid Tire

MULLERS AND MIXERS

1—CLEARFIELD, #920, 9' Dia., 25-30 cu. ft.
2—SIMPSON, #0, 3' Dia. 175 lbs. Style M
1—SIMPSON, #3, 8' Dia. Open Gear, with loader 20-25 cu. ft. batch
1—SIMPSON #1, 4' dia., 4 cu. ft. batch, 2 wheels, Style UD, w/loader and dust hood
1—B & P Mulbaro, #3½
1—B & P, Conventional, SIMPSON type, 87½" Dia., arranged for cooling
2—LANCASTER Mixers, #4, 5' Dia. Pan, 3-9 cu. ft. cap.

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MODERN, SWINDELL, WHITING, TREADWELL—All Types and Sizes—Ready for your Needs!

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1—COLEMAN, OIL, one compartment, recirc., 60" W x 80" H x 14' 6" L
1—COLEMAN, Gas, 2 Comp. and 5 drawers, OD, 22' x 12' x 10'
2—ROSS, Gas, 2 compartment, recirc., rack type, 6½' x 14' x 7'
3—GENRICH, elec., 3 drawer, preheating, auto-control, 9' H x 8' W x 6'7" L

SAND CONDITIONING

1—ROYER PREPARATOR, Comb. Model NDC, 25 Ton/hr. Scrap removal, 8' x 8' hopper
1—ROYER, NB-2, Portable, 7-10 tons/hr. cap.
3—B & P SCREENERATORS, Model S and M
1—HANDY - SANDY & REDDY - SANDY UNIT—Excellent Buy!

SAND CUTTERS

1—AMERICAN, 15 HP, 60" Reel, 56" Wheel

MISCELLANEOUS

1—WHITING #3 PULVERIZER, Brand New, w/10 HP G.E. Motor
1—NATIONAL ENGINEERING SAND-PREPARATOR Unit w/permanent magnet pulley
1—HOWE WEIGHTOGRAPH SCALE, Model 1700
1—KANE & ROACH WIRE STRAIGHTENER, Model DX-5
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Classified Forms Close the 13th of Month Preceding Issue

FOUNDRY

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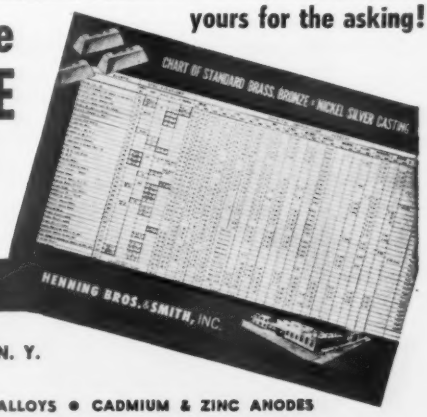
send for this valuable quick-reference 17" x 22" standard alloy wall chart FREE

yours for the asking!

This see-at-a-glance wall chart will save you hours of time in making up your specs. Chart shows all types of customer specifications: Navy, S.A.E., A.S.T.M., and Federal. It shows chemical composition, by percentages, of 37 alloys. Write today for your copy to:



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HYacinth 7-3470-1-2-3

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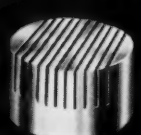

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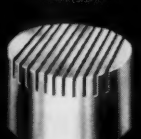
SHALLOW HEAD .031 Wide or Narrow Slots .014 .010



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- FOR CLEANING SLOTS
- MADE OF TEMPERED STEEL
- EASY TO USE

Manufactured by **C.M. SMILLIE & CO.** 1124 WOODWARD HGTS., FERNDALE 20, MICH

Circle 741 on Inquiry Card—Page 51

GLUTRIN
LIQUID BINDER

GOULAC
DRY BINDER

For

CORE WORK, SAND FACINGS, SPRAYS

Write for pamphlets giving detailed information. Both materials carried in stock by America's foremost foundry jobbers

Robeson Process Company
(Established 1905)

American Gum Products Co.
(Established 1915)

GENERAL OFFICES AND PLANT: • ERIE, PA.

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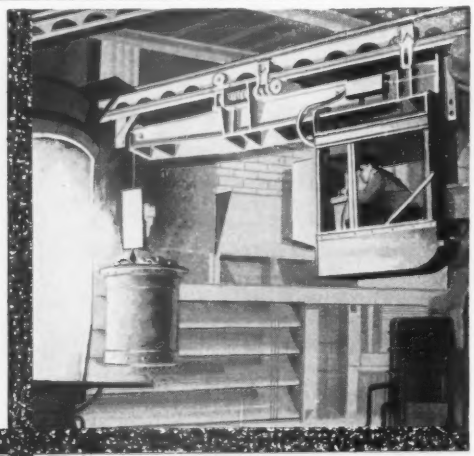

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or

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High temperature stability?

Resistance to thermal shock?

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GREAT LAKES CARBON CORPORATION
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INC.

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WHAT DO YOU NEED IN A COST METHOD

The simplest and most complete method of costing ever prepared for nonferrous foundries is found in

BASIC COST PRINCIPLES FOR NON-FERROUS FOUNDRIES

(Non-Ferrous Founders' Society Publication)

Up-to-the-minute guide for costing in both small and large foundries. Prepared by practical foundrymen, based on 10 years of research and experience of the industry under Government Pricing Regulations.

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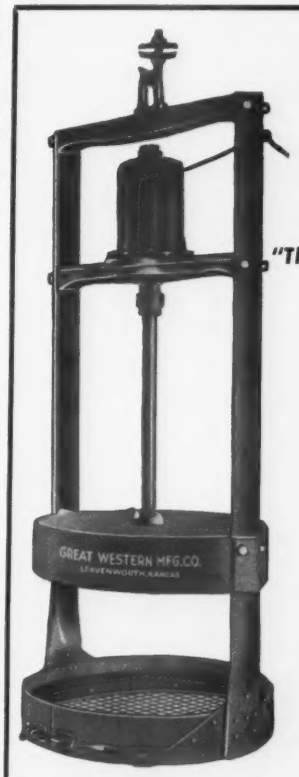

TYPE "CR". Complete price $350.00. 24" dia. round sieve. Sifts, fluffs, mixes, aerates sand. Height 4'6", weight 250 lbs., ⅓ H.P. enclosed motor.

TYPE "V". Price 20" Sieve, $275.00. Does the work of 10 men. Screens sand, Fine, Medium, and Coarse. 20" dia. sieve with special clamp for 5-second changes. 4'6" high, weight 100 lbs., fully-enclosed 1/6 H.P. motor. Also available in Giant V-5 with 36" sieve for triple capacity . . . Price $495.00.

PROMPT DELIVERY from your Foundry Supply House

TYPE "HL". Price $250.00 complete, less sieves. Laboratory model especially designed for laboratory sand control fitted with 1/6 H.P. enclosed motor.

TYPE "CS" Complete price $360.00. 24" square sieve. A continuous operation sieve. Requires no dumping, as refuse is ejected off to one side. Height 4'10", weight 295 lb., ⅓ H.P. enclosed motor.

MAIL THE COUPON NOW!

GREAT WESTERN MFG. CO.

Leavenworth, Kansas Phone MU-22291

☐ Send Additional FREE Information

NAME

ADDRESS

CITY STATE

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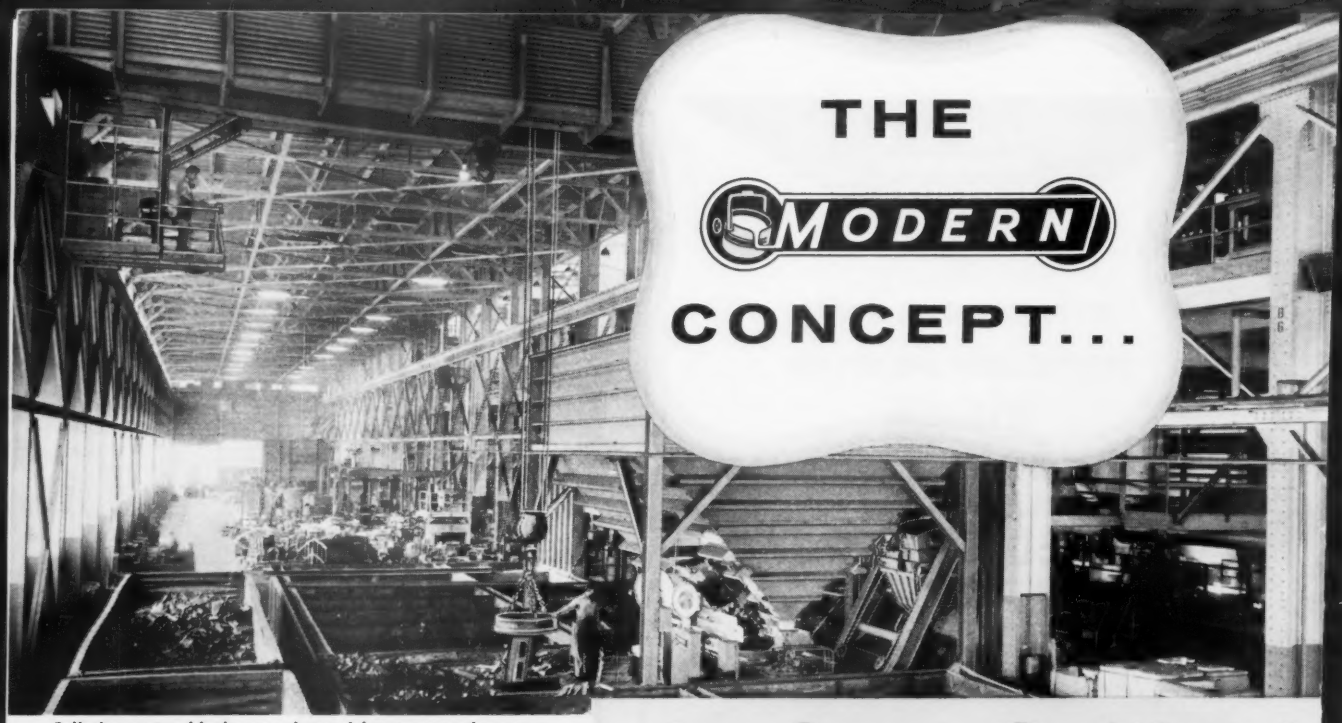
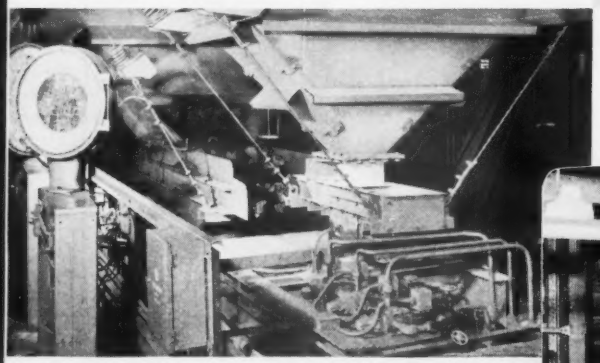
THE MODERN CONCEPT...



Full-size motor blocks are charged by crane and magnet through scale-mounted, weigh hopper to small-cone, orange-peel bucket.

in Cost Cutting!

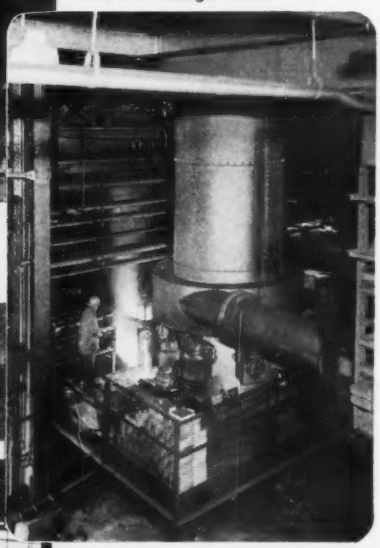
Automization of the charging, melting and pouring cycle may follow set patterns. Still every installation is different:



Coke and stone from bins are weighed and recorded automatically.

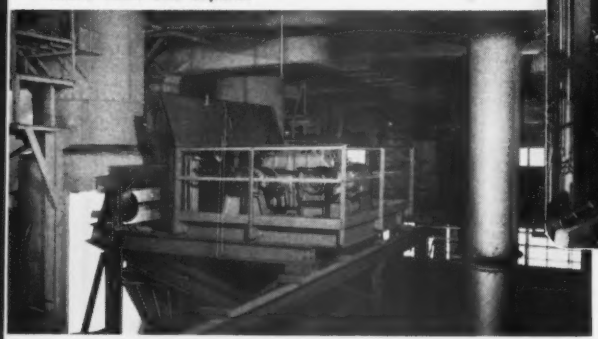
Upper portion of charger indexes to serve more than one cupola.

Slag is granulated in water and flows to sludge tank.



DIFFERENCES IN —

- *lengths of melting time and types of iron may alter cupola designs . . .*
- *cupola locations and yard conditions call for differences in swiveling and indexing of the charger . . .*
- *charging cycles determining the stock bin and feeder equipment.*
- *automatic weighing and recording instruments — inventory the components, eliminate human error and insure uniformity of metal . . .*



Modern cupolas with continuous-tapping, front slagging spouts.

In all these and other ways MODERN's single responsibility for engineering, fabrication and erection is cutting the tonnage costs for the Bullard Company. Other case studies in catalog 147-C . . .

MODERN EQUIPMENT COMPANY, Dept. F-7, Port Washington, Wisconsin

Mail to my attention:

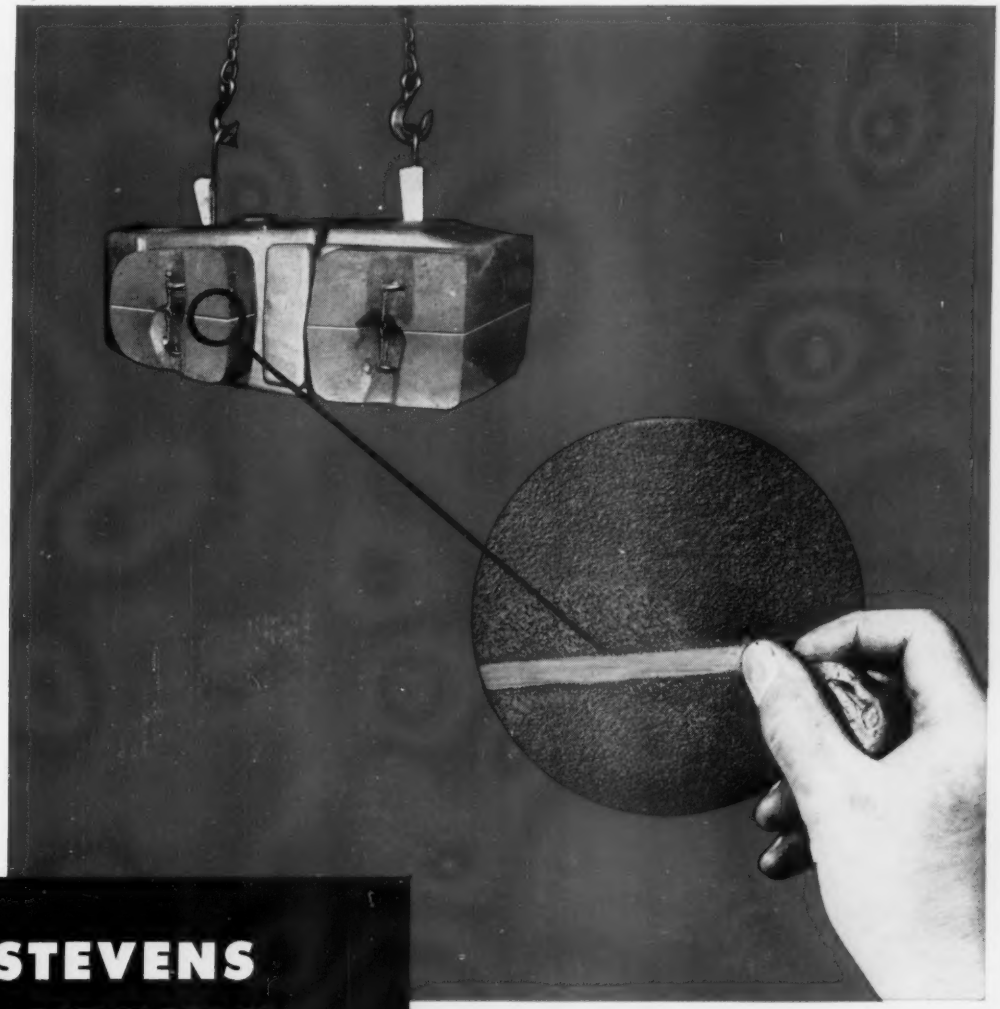
- ☐ Catalog 147-C on charging and melting . . .
- ☐ Catalog 150 on cranes, and monorail systems . . .
- ☐ Catalog P-152-A on ladles and pouring . . .

Company.....

Street.....Box.....

City.....Zone.....State.....

My Name.....



STEVENS MUDDING COMPOUND . . . . . gives perfect results in unskilled hands

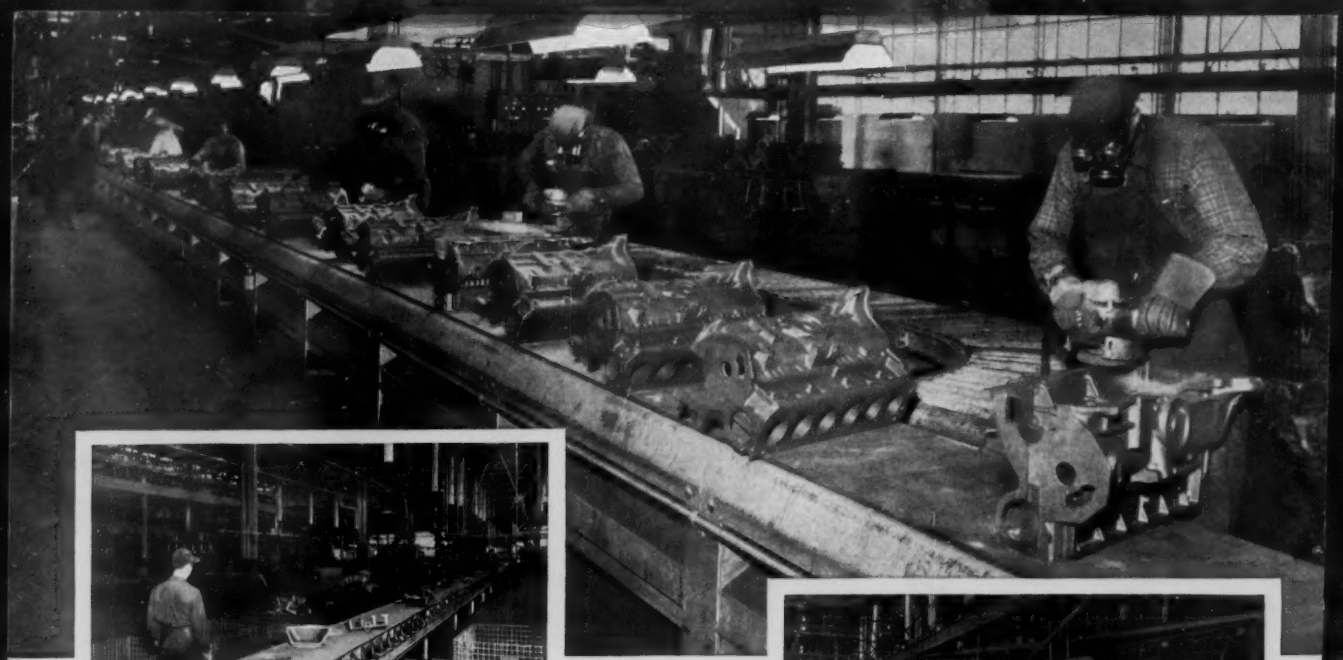
Your core workers will like the way Stevens Slick-Seal Mudding Compound always goes on smooth and easy. There's no crumbling, rolling or balling up behind thumb or finger. They'll like the way either black or white Slick-Seal easily washes off their hands with just plain water.

This new compound remains plastic and workable. Yet light applications of Slick-Seal dry in one to two hours; heavier applications in four to five hours. Edges won't shrink or curl when subject to oven heat . . . flowing metal won't dislodge Slick-Seal. Stevens mudding compound is a high heat resistant facing. It prevents fins or burn-in at pasted joints.

Why not order Slick-Seal Mudding Compound today?

FREDERIC B.
STEVENS
INCORPORATED
EVERYTHING FOR A FOUNDRY
DETROIT 34, MICHIGAN

Have you tried Steveco$_2$ (O_2 binder)? It really does the job.
Write for Stevens Technical Bulletin FA-130!

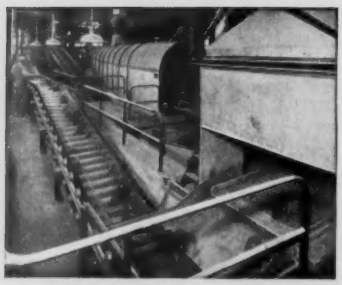


Above; Unloading Zone of 315′ Long Sorting Belt Handling Miscellaneous Castings After Grinding.

Above; 370′ Long—24″ Wide Flat Top Chipping Conveyor Handling Automotive Castings Through Various Cleaning Room Operations. *At the Right;* 130′ Long Chipping Conveyor for Finishing Head Castings.

Engineered Castings Handling Systems

. . . assure the continuous, uninterrupted flow of castings through chipping, grinding, sorting and inspection departments; — eliminate repeated handling and rehandling of work in process; — avoid stock piling between operations; — increase tons per hour production per man; — and reduce costs.



Apron Conveyor Handling Hot Castings from Vibrating Shakeout.

Castings Cooling and Sorting Conveyor in Cleaning Room of High Production Gray Iron Foundry.

● Bartlett-Snow castings handling and cleaning room installations reduce the time and cost of handling castings from the shakeout to the shipping room. They synchronize and coordinate all cleaning room operations to the tonnage passing over the foundry shakeout. Belt, apron, oscillating, roller, car type and slat conveyors, engineered to meet your individual requirements!

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